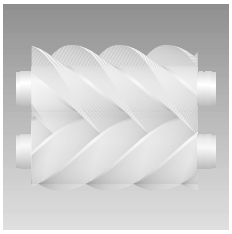

Atlas Copco Stationary Air Compressors

GA90 - GA110 - GA132 - GA160 - GA200 - GA250 - GA315
GA90 W - GA110 W - GA132 W - GA160 W - GA200 W - GA250 W - GA315 W

Instruction book

Important

1. For GA/GA W 90 up to 160, this book applies to compressors from serial number **AIF-078 300** onwards.
2. For GA/GA W 200 up to 315, this book applies to compressors from serial number **AIF-078 302** onwards.
3. This book must be used together with the "User manual for Elektronikon® regulator for GA-GR-ZA-ZE-ZR-ZT compressors".

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- This instruction book meets the requirements for instructions specified by the machinery directive 98/37/EC and is valid for CE as well as non-CE labelled machines.

No. 2920 1475 00

Registration code: APC G≥90/'99 / 38 / 963

2002-10

www.atlascopco.com

Atlas Copco

This instruction book describes how to handle the machines to ensure safe operation, optimum efficiency and long service life.

Read this book before putting the machine into operation to ensure correct handling, operation and proper maintenance from the beginning. The maintenance schedule comprises measures for keeping the machine in good condition.

Keep the book available for the operator and make sure that the machine is operated and that maintenance is carried out according to the instructions. Record all operating data, maintenance performed, etc. in an operator's logbook available from Atlas Copco. Follow all relevant safety precautions, including those mentioned on the cover of this book.

Repairs must be carried out by trained personnel from Atlas Copco who can be contacted for any further information.

In all correspondence mention the type and the serial number, shown on the data plate.

For all data not mentioned in the text, see sections "Preventive maintenance schedule" and "Principal data".

The company reserves the right to make changes without prior notice.

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1 LEADING PARTICULARS

1.1 General description

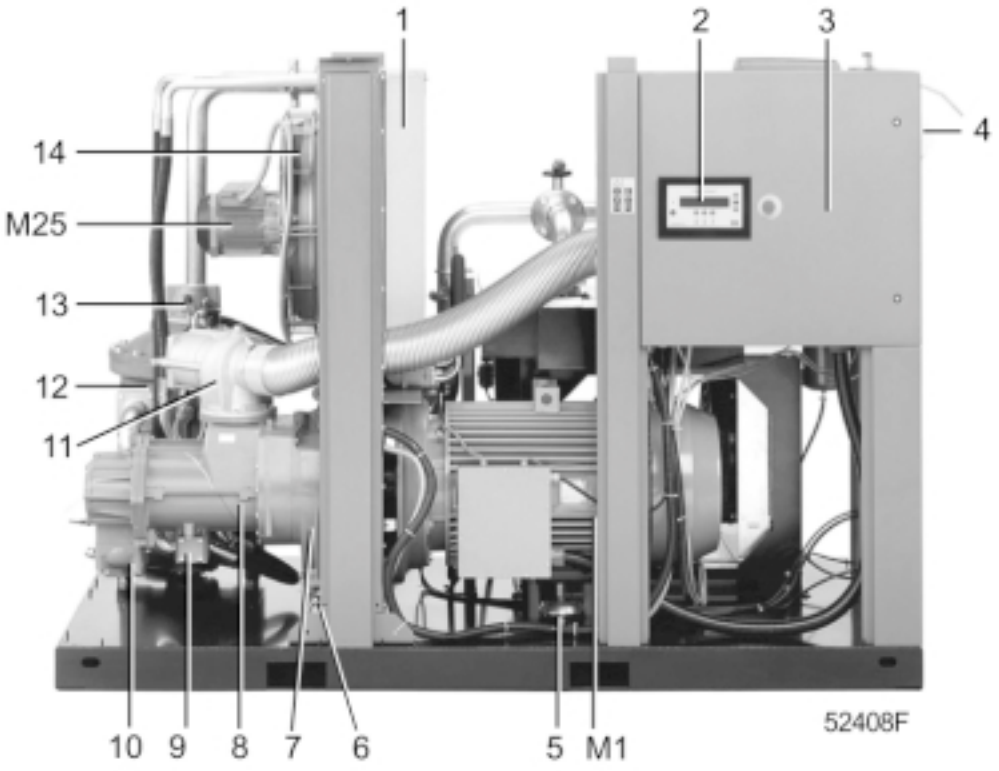
GA90 up to GA315 and GA90 W up to GA315 W are single-stage, oil-injected screw compressors, driven by an electric motor and enclosed in a sound-insulated bodywork.

GA90 up to GA315 are air-cooled, abbreviated as "GA". GA90 W up to GA315 W are water-cooled, abbreviated as "GA W".

GA Full-feature (FF) compressors are provided with an air dryer integrated in the bodywork. The system includes dryer by-pass valves.

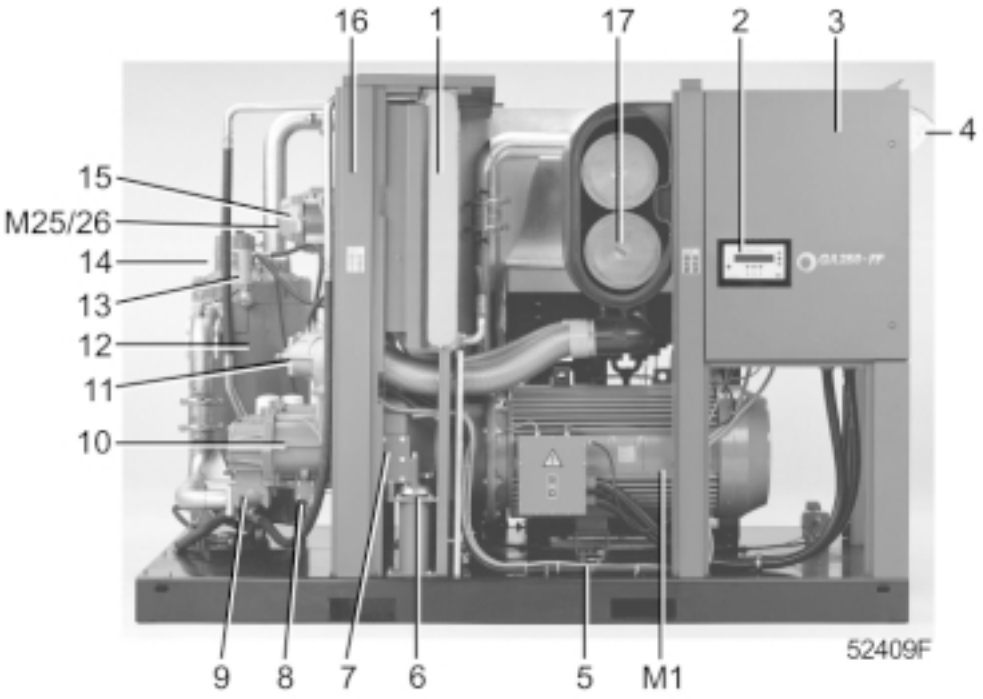
The compressors are available for a maximum working pressure of:
- 7.5, 8.5, 10 or 13 bar(e) for 50 Hz versions
- 107, 132, 157 or 200 psig for 60 Hz versions

The compressors include mainly:
- Air filter(s)
- Compressor element **1)**
- Air receiver/oil separator
- Air cooler
- Oil cooler(s)
- Drive motor
- Gear casing
- Unloader **1)**
- Elektronikon® control system
- Safety devices
- Air dryer with by-pass valves (Full-feature compressors only)



1	Oil coolers	7	Gear casing	12	Air receiver
2	Control panel	8	Compressor element	13	Minimum pressure valve
3	Electric cabinet	9	Oil stop valve	14	Cooling fan
4	Power supply inlet	10	Check valve	M1	Drive motor
5	Vibration damper	11	Unloader	M25	Fan motor
6	Vibration damper				

Fig. 1.1 Front view, GA110 FF



1	Oil coolers
2	Control panel
3	Electric cabinet
4	Power supply inlet
5	Vibration damper
6	Vibration damper
7	Gear casing
8	Oil stop valve
9	Check valve
10	Compressor element
11	Unloader
12	Air receiver
13	Safety valve
14	Minimum pressure valve
15	Arrow, motor rotation direction
16	Cooling fans
17	Air filters
M1	Drive motor
M25/26	Fan motors

Fig. 1.2 Front view, GA250 FF

1	By-pass valve
2	By-pass valve
3	By-pass valve
4	Oil coolers
5	Vent plugs
6	Air cooler
7	Cooling fan
8	Unloader
9	Oil drain plug, air receiver
10	Air receiver
11	Oil cooler by-pass valve
12	Oil filters
13	Condensate trap
14	Oil drain plug
15	Oil drain plug
16	Air dryer
17	Condensate outlets
18	DD filter (option)
19	Compressed air outlet
20	Air filter
M25	Fan motor

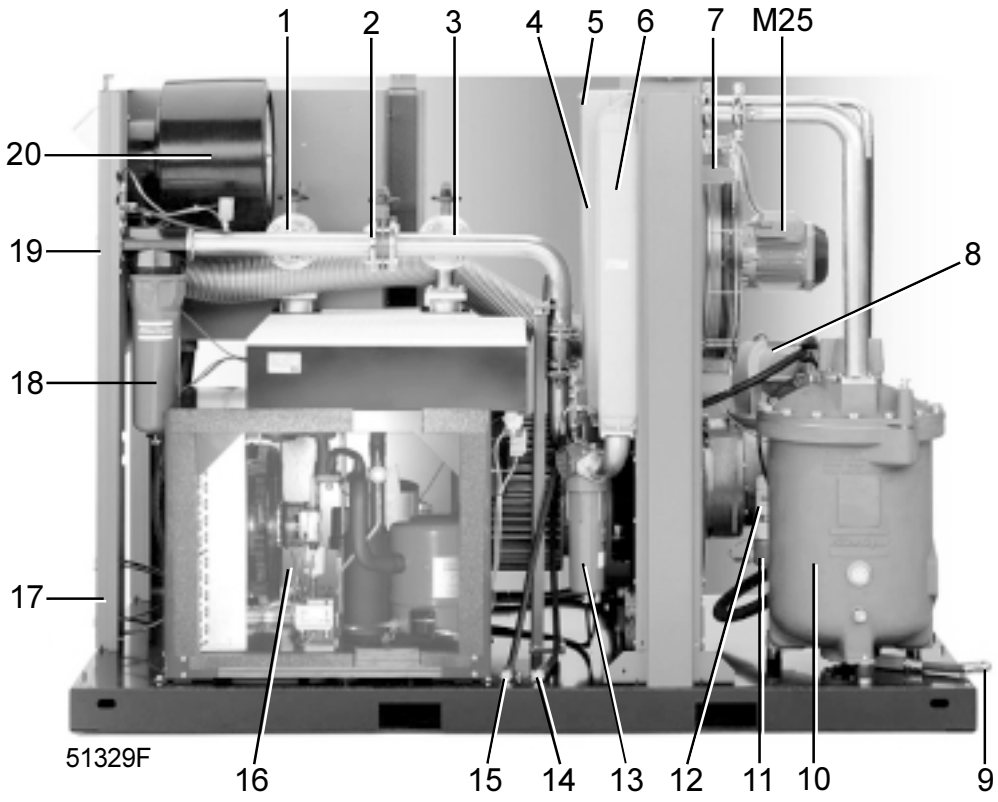


Fig. 1.3 Rear view, GA110 FF

1.1.1 Main options

Full-feature
A refrigerant dryer is fully integrated in the bodywork of the compressor. This "all-in-one" feature reduces the required space for installation and provides savings on piping installation cost.

Integrated DD filter
Full-feature compressors can be provided with an integrated filter of the DD type to limit carry-over of solid particles and oil. By integrating a DD filter, the compressor delivers Quality Air according to ISO 8573-1, Class 2.4.2.

Integrated OSD
The OSD (Oil Separating Device) separates the oil residues from the condensate water. The clean water can be drained into the sewer without any further treatment. The separated oil is collected and must be disposed of according to prevailing regulations.

Electronic drain
The EWD (Electronic Water Drain) assures proper draining of condensate and prevents water from entering the compressed air net. At any malfunction of the draining process, the EWD generates a warning message on the display of the Elektronikon regulator.

Energy recovery
The compressors can be provided with the Atlas Copco energy recovery systems to recover the major part of the compression heat in the form of hot water without any influence on the compressor performance.

Oil containing frame
This frame is installed under the machine and will collect oil from occasional leakage and avoid oil to spread over the floor.

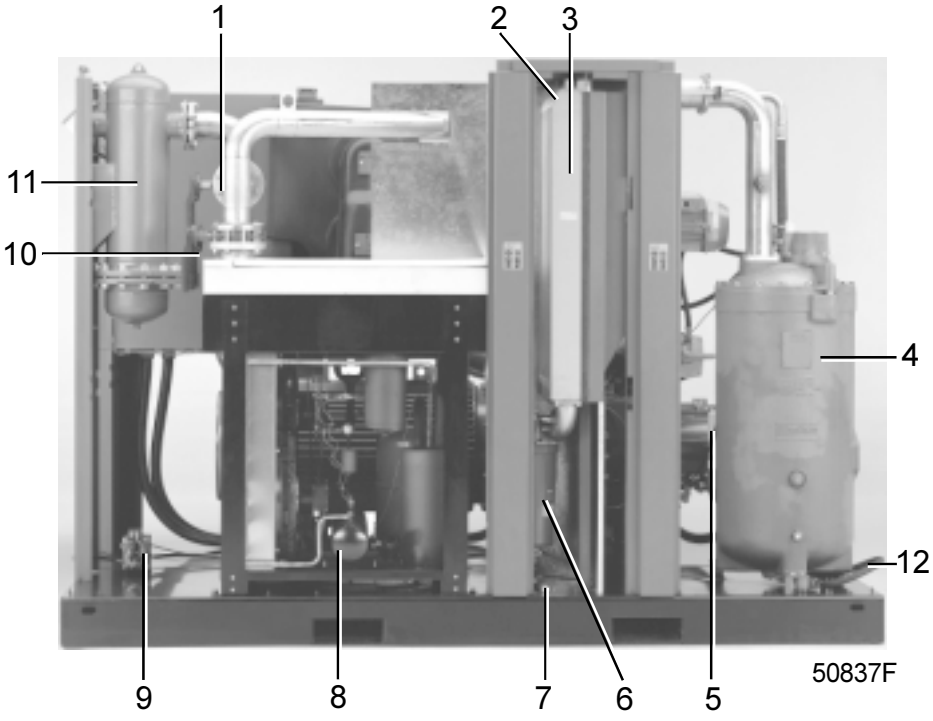
Modulating control
The modulating control system is designed to maintain a narrow net pressure band (0.2 bar) by throttling the air inlet, thus reducing the air flow (50% - 100%).

Heavy-duty air intake filter
A two-stage heavy-duty air intake filter kit is available allowing the compressor to operate in heavily contaminated surroundings (e.g. cement or mining industry). The larger dust particles are collected in the first stage of the filter. The filter efficiency (SAE fine) is 99% at 1µm, 99.8% at 2µm and 99.9% at 3 µm.

Rain protection
If a GA compressor is installed outdoors, the rain protection prevents rain from entering the machine. At the same time it protects the display of the Elektronikon regulator against sun and rain.

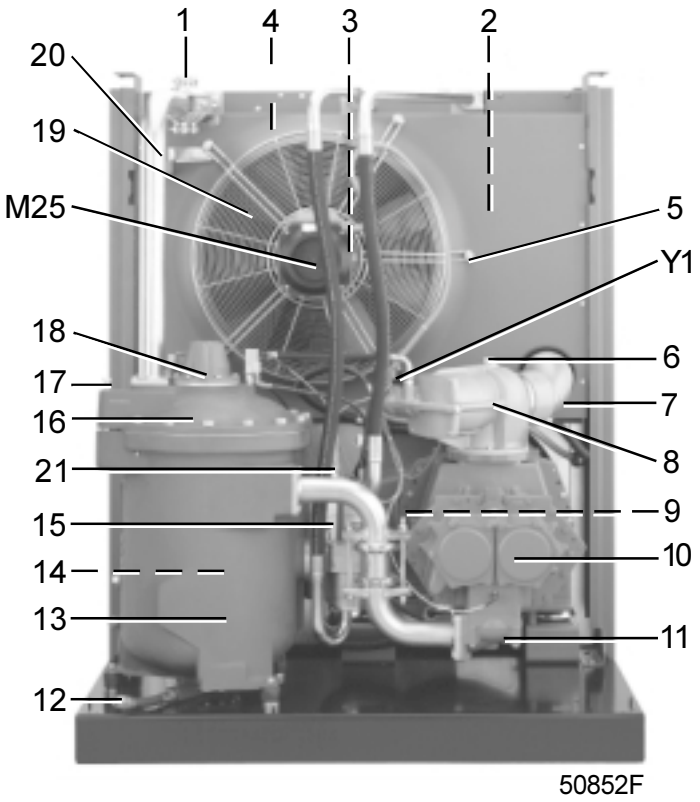
High ambient temperature version
The GA HAT (High Ambient Temperature) version is specially designed for continuous operation in humid and high ambient temperature environment up to 50 degrees Celsius. This option is available for GA air and water-cooled compressors except for 13 bar (200 psi) and GA Full-feature compressors.

Phase Sequence Relay
The phase sequence relay prevents the drive motor from rotating in the wrong direction.



1 By-pass valve
2 Vent plugs
3 Air cooler
4 Air receiver
5 Oil filters
6 Condensate trap
7 Oil drain plugs
8 Air dryer
9 Electronic water drain (option)
10 By-pass valves
11 DD filter (option)
12 Oil drain plug, air receiver

Fig. 1.4 Rear view, GA250 FF



1	Pipe coupling
2	Oil coolers
3	Arrow, motor rotation direction
4	Air cooler
5	Bolts
6	Filler plug (only to be used at initial start-up)
7	Air inlet hose
8	Unloader
9	Arrow, rotation direction of drive motor
10	Compressor element
11	Check valve
12	Oil drain plug, air receiver
13	Air receiver
14	Oil separator element
15	Oil filters
16	Receiver cover
17	Bolt
18	Minimum pressure valve
19	Cooling fan
20	Pipe, air receiver to air cooler
21	Safety valve
M25	Fan motor
Y1	Loading solenoid valve

Fig. 1.5 Side view, GA110 FF

1	Pipe coupling
2	Air cooler
3	Oil coolers
4	Cooling fan
5	Air inlet hoses
6	Filler plugs (only to be used at initial start-up)
7	Check valves
8	Compressor elements
9	Arrow, rotation direction of drive motor
10	Unloaders
11	Air receiver
12	Oil filters
13	Oil separator element
14	Receiver cover
15	Bolt
16	Minimum pressure valve
17	Safety valve
18	Pipe, air receiver to air cooler
19	Oil drain plug, air receiver
20	Bolts
M25/26	Fan motors
Y1	Loading solenoid valve

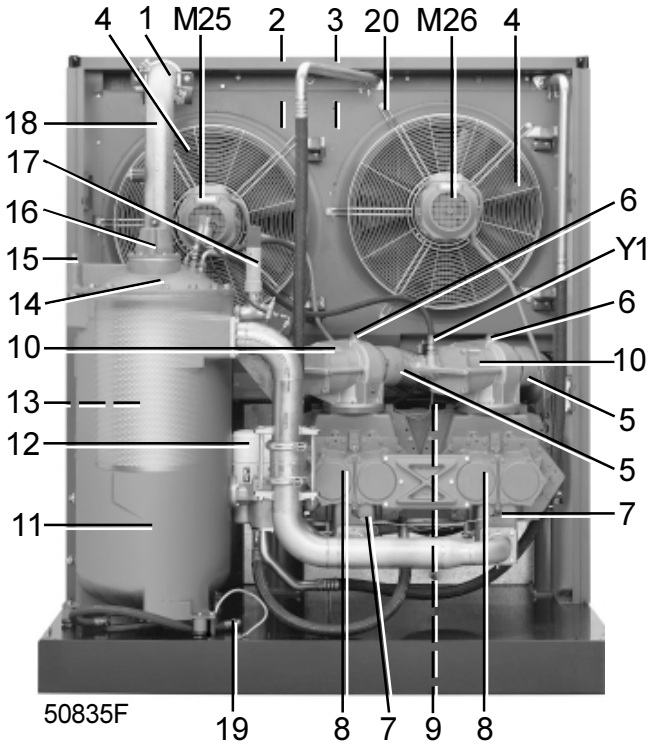


Fig. 1.6 Side view, GA250 FF

PT 1000 thermal protection
The PT 1000 thermal protection provides protection of the drive motor. Five sensors are installed in the motor, two to measure the temperature of the bearings and three to measure the temperature of the windings. The readings can be called up on the display of the Elektronikon regulator. A message will appear on the display and the general alarm LED will light up if one of the temperatures exceeds the shut-down warning setting. If the temperature rises above the shut-down setting, the compressor will shut down and the general alarm LED starts blinking.

DIN/BSP or ANSI/NPT connections
For GA90 up to 160 a BSP or NPT connection can be chosen. For GA200 up to 315 a DIN or ANSI connection can be chosen.

HD Roto-fluid
Special oil for Atlas Copco GA oil-injected screw compressors. It provides better cooling and extends the oil change interval to 8000 hours.

Cooling air outlet ducting
Diverts the cooling air in such a way that the hot air is not led to the cooling air inlet. This option is only available for air-cooled compressors.

Lifting device
The lifting device is a solid steel beam construction bolted to the compressor. It allows the customer to lift the compressor by means of e.g. a crane.
It is AIB and CE approved and complies with all applicable safety standards.

1.2 Air flow / regulating system (Figs. 1.7 and 1.8)

1.2.1 Air flow 1)

Air drawn through filter (1) and unloader (2) is compressed in compressor element (14). Compressed air and oil are discharged through check valve (16) to air receiver/oil separator (17) in which the oil is separated from the compressed air. The air is blown through minimum pressure valve (19) to air cooler (4). The cooled air is discharged through condensate trap (28) and outlet valve (27) towards the air net.

Check valve (16) prevents blow-back of compressed air.

Minimum pressure valve (19) prevents the receiver pressure from dropping below a minimum pressure. The valve has a built-in check valve.

1.2.2 Condensate drain system

A condensate trap (28) is installed downstream of the air cooler to prevent condensate from entering the air outlet pipe. The trap is provided with a float valve for automatically draining condensate and with a manual drain valve.

Full-feature compressors, which are provided with an air dryer, have a second condensate trap downstream of the dryer. This trap is also provided with a float valve for automatically draining condensate and with a manual drain valve.

1.2.3 Oil system 1)

Air pressure forces the oil from receiver (17) through oil coolers (6), filters (7) and oil stop valve (15) to compressor element (14) and the lubrication points.

Oil stop valve (15) prevents the compressor element from flooding with oil when the compressor is stopped.

Valve (26) by-passes oil coolers (6) when starting the compressor from cold condition, to ensure rapid warming of the oil to normal working temperature.

In air receiver (17) most of the oil is removed from the air centrifugally. Almost all of the remaining oil is removed by separator element (18).

1.2.4 Cooling system

On GA, the system includes air cooler (4) and oil coolers (6), cooled by one or two fans (5) **2)**.

GA W are provided with a cooling water system, including a combined oil and air cooler.

1.2.5 Regulating system

The system keeps the net pressure within programmable pressure limits by automatically loading and unloading the compressor depending on the air consumption. It is controlled by Elektronikon® regulator (E1) which also protects the compressor and monitors components subject to service. See section 1.3.

1.2.5.1 GA/GA W 90/160

Unloading

If the air consumption is less than the air delivery of the compressor, the net pressure increases. When the net pressure reaches the upper limit of the working pressure (unloading

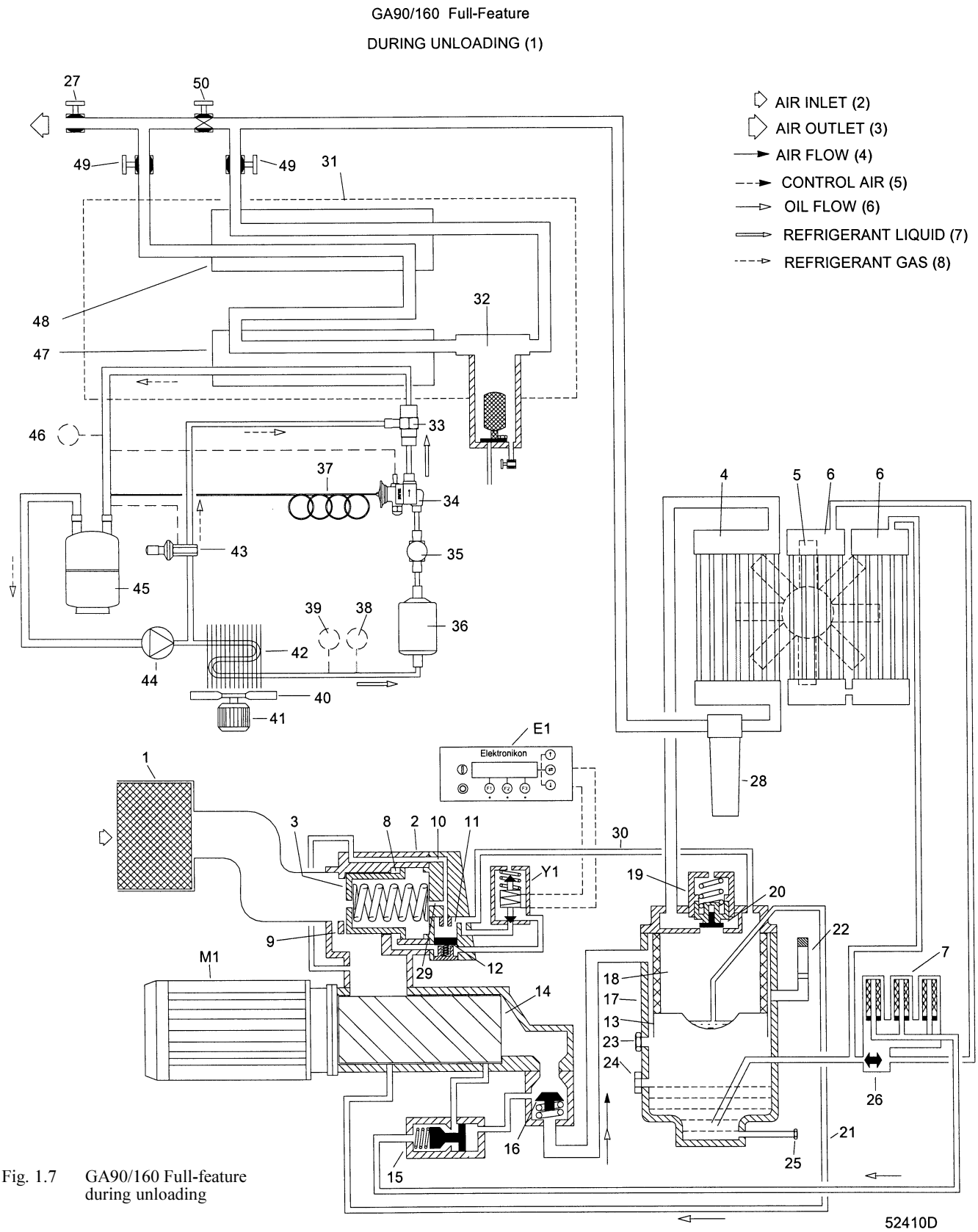


Fig. 1.7 GA90/160 Full-feature during unloading

1	Air filter	9	By-pass opening	17	Air receiver
2	Unloader	10	Blow-off channel	18	Oil separator element
3	Unloading valve	11	Chamber, receiver pressure	19	Minimum pressure valve
4	Air cooler	12	Valve	20	Check valve
5	Cooling fan	13	Shield	21	Oil scavenging line
6	Oil coolers	14	Compressor element	22	Safety valve
7	Oil filters	15	Oil stop valve	23	Oil filler plug
8	Chamber, control pressure	16	Check valve	24	Oil level indicator

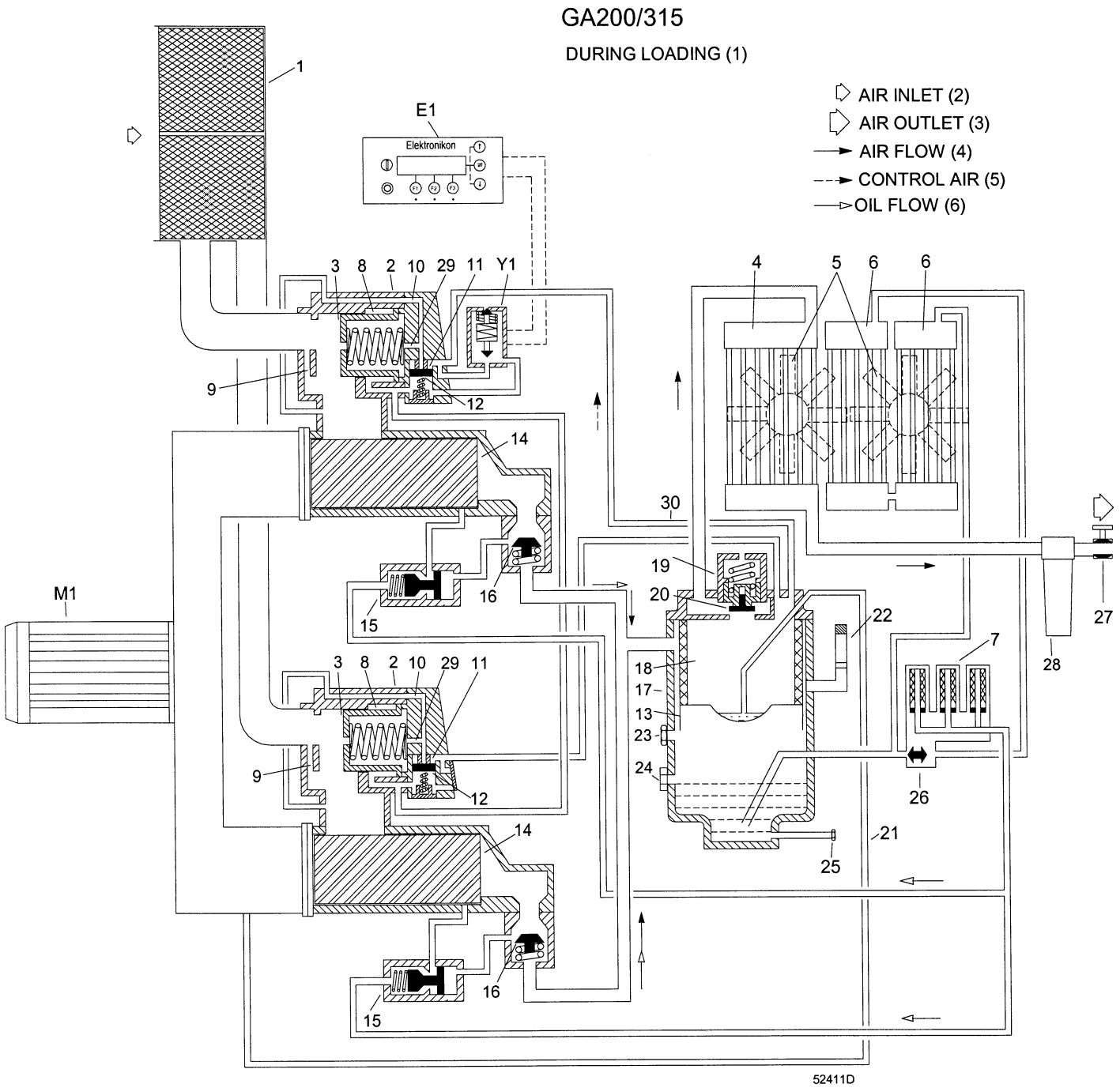


Fig. 1.8 GA200/315 during loading

25	Oil drain plug	34	Thermostatic expansion valve	44	Refrigerant compressor
26	By-pass valve	35	Sight-glass	45	Liquid separator
27	Air outlet valve (customer's installation)	36	Filter/dryer	46	Low pressure switch
28	Condensate trap	37	Capillary tube	47	Air/refrigerant heat exchanger
29	Channel	38	Fan control switch	48	Air/air heat exchanger
30	Flexible, receiver pressure	39	High pressure switch	49	By-pass valves
31	Insulating block	40	Fan	50	By-pass valve
32	Condensate trap	41	Fan motor	E1	Elektronikon regulator
33	Liquid – gas mixer	42	Condenser	M1	Drive motor
		43	Hot gas by-pass valve	Y1	Loading solenoid valve

Figs. 1.7 and 1.8 Regulating system

pressure), solenoid valve (Y1) is de-energized. The plunger of the valve moves downwards by spring force:

1. The plunger of solenoid valve (Y1) shuts off the supply of receiver pressure towards chamber (8).
2. Control pressure present in chamber (8) is vented to atmosphere through loading solenoid valve (Y1). Unloading valve (3) closes by spring force.
3. Valve (12) is pushed downwards releasing receiver pressure through flexible (30) and channels (10 and 29) towards the air inlet.
4. A small flow of air remains drawn in through hole (9) and channel (10), and is blown from receiver (17) via flexible (30) to the air inlet.
5. Air delivery is stopped (0 %), the compressor runs unloaded.

Loading

When the net pressure decreases to the lower limit of the working pressure (loading pressure), solenoid valve (Y1) is energized. The plunger of solenoid valve (Y1) moves upwards against spring force:

1. The plunger of solenoid valve (Y1) opens the supply of receiver pressure towards chamber (8). Unloading valve (3) opens against spring force.
2. Receiver pressure also pushes valve (12) upwards, shutting off blow-off channels (10 and 29).
3. Air delivery is resumed (100 %), the compressor runs loaded.

1.2.5.2 GA/GA W 200/315

The operation of the system is similar to that of GA90/160, except that GA/GA W 200/315 are equipped with two compressor elements, each provided with an unloader, check valve and oil stop valve.

1.3 Elektronikon® control system

In general, the Elektronikon regulator has following functions:
- automatic control of the compressor
- protecting the compressor
- monitoring components - service warning
- automatic restart after voltage failure

1.3.1 Automatic control of the compressor

The regulator maintains the net pressure between programmable limits by automatically loading and unloading the compressor. A number of programmable settings, e.g. the unloading and loading pressures, the minimum stop time and the maximum number of motor starts are taken into account.

The regulator stops the compressor whenever possible to reduce the power consumption and restarts it automatically when the net pressure decreases. In case the expected unloading period is too short, the compressor is kept running to prevent too-short standstill periods.

Warning *A number of time-based automatic start/stop commands may be programmed. Take into account that a start command will be executed (if programmed and activated), even after manually stopping the compressor.*

1.3.2 Protecting the compressor

Shut-down and motor overload

If the temperature at the outlet of the compressor or at the outlet of the compressor element exceeds the programmed shut-down level, the compressor will be stopped. This will be indicated on the control display.

The compressor will also be stopped in case of overload of the drive motor or in case of overload of the fan motor(s).

Consult the safety precautions as mentioned in section 4 and remedy the trouble. See also the User manual for Elektronikon regulator, section Status data menu.

Shut-down warning

If the regulator detects a temperature just below the programmed shut-down level, this will be indicated on the control panel to warn the operator before the shut-down level is reached.

The message disappears as soon as the warning condition disappears.

1.3.3 Service warning

A number of service operations are grouped (called Level A, B, C, ...). Each level has a programmed time interval. If a time interval is exceeded, a message will appear on display (2-Fig. 1.9) to warn the operator to carry out the service actions belonging to that level. See section 4.

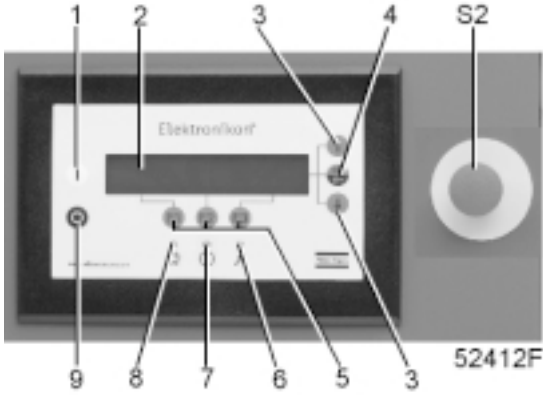


Fig. 1.9 Control panel

1.3.4 Automatic restart after voltage failure

The regulator has a built-in function to automatically restart the compressor if the voltage is restored after voltage failure. For compressors leaving the factory, this function is made inactive. If desired, the function can be activated. Consult Atlas Copco.

Warning *If activated and provided the module was in the automatic operation mode, the compressor will automatically restart if the supply voltage to the module is restored within a programmed time period.*

The power recovery time (the period within which the voltage must be restored to have an automatic restart) can be set between 1 and 255 seconds or to Infinite. If the power recovery time is set to Infinite, the compressor will always restart after a voltage failure, no matter how long it takes to restore the voltage. A restart delay can also be programmed, allowing e.g. two compressors to be restarted one after the other.

1.3.5 Permissive start

After a start command (either automatic start by the electronic regulator or manual start), the permissive start function is operative: if the oil injection pressure at the compressor elements exceeds the programmed level, the compressor will not start (indicated as <<Start failure>>).

1.4 Control panel

1.4.1 LEDs/buttons/keys

Ref.	Designation	Function
1	Start button	Push button to start the compressor. LED (8) lights up indicating that the Elektronikon regulator is operative.
2	Display	Indicates messages concerning the compressor operating condition, a service need or a fault.
3	Scroll keys	Keys to scroll upwards or downwards through the display.
4	Tabulator key	Key to select the parameter indicated by a horizontal arrow. Only the parameters followed by an arrow pointing to the right are accessible for modifying.
5	Function keys	Keys to control and program the compressor. See section 1.4.3.
6	Voltage on LED	Indicates that the voltage is switched on.
7	General alarm LED	Is alight if a shut-down warning condition exists. See section 1.3.
7	General alarm LED	Blinks if a shut-down condition exists, if an important sensor is out of order or after an emergency stop. See section 1.3.
8	Automatic operation LED	Indicates that the regulator is automatically controlling the compressor.
9	Stop button	Push button to stop the compressor. LED (8) goes out.
S2	Emergency	Push button to stop the compressor immediately in case of emergency. After remedying the trouble, unlock the button by pulling it out.

1.4.2 Display

The following is a typical example of the main screen, showing in short the status of the compressor:

Compressor Outlet		7.0 bar
Automatically loaded		↓
Menu		Unload
F1	F2	F3

Fig. 1.10 Example of the main screen

1.4.3 Function keys (5-Fig. 1.9)

The keys are used:
- to call up or program settings
- to reset an active motor overload, shut-down or service message, or an emergency stop
- to have access to all data collected by the regulator

The functions of the keys vary depending on the displayed menu. The actual function is indicated on the bottom line of the display just above the relevant key.

The most common functions are listed below:

Designation	Function
Add	To add compressor start/stop commands (day/hour)
Back	To return to a previously shown option or menu
Cancel	To cancel a programmed setting when programming parameters
Delete	To delete compressor start/stop commands
Help	To find the Atlas Copco internet address
Limits	To show limits for a programmable setting
MainScreen	To return from a menu to the main screen (Fig. 1.12)
Menu	Starting from the main screen (Fig. 1.12), to have access to submenus
Menu	Starting from a submenu, to return to a previous menu
Modify	To modify programmable settings
Program	To program modified settings
Reset	To reset a timer or message
Return	To return to a previously shown option or menu
Extra	To find information regarding the installed modules

1.4.4 Emergency stop button (S2-Fig. 1.9)

In case of emergency, press the button to stop the compressor immediately.

Pressing the button breaks the circuit to the drive motor. **The circuit to the control circuit and other electrical components is not broken.**

Warning
- *Before starting any maintenance or repairs, wait until the compressor has stopped and open the isolating switch (customer's installation) to switch off the voltage to the compressor.*
- *Close the air outlet valve and open condensate drain valves (1 and 2-Fig. 3.7)*

Apply all relevant safety precautions, including those mentioned in this book.

1.5 Menu-driven control programs

To facilitate programming and controlling the compressor, menu-driven programs are implemented in the electronic module.

A simplified menu flow is shown in Fig. 1.11.

1.5.1 Function of control programs

Program/ Function	Description
Main screen	Shows in short the operation status of the compressor. It is the gateway to all functions. See Fig. 1.12.
Status data	Calling up the status of the compressor protection functions: - shut-down - shut-down warning - service warning - warning Resetting of a shut-down, motor overload and service condition.
Measured data	Calling up: - actually measured data - the status of a number of inputs

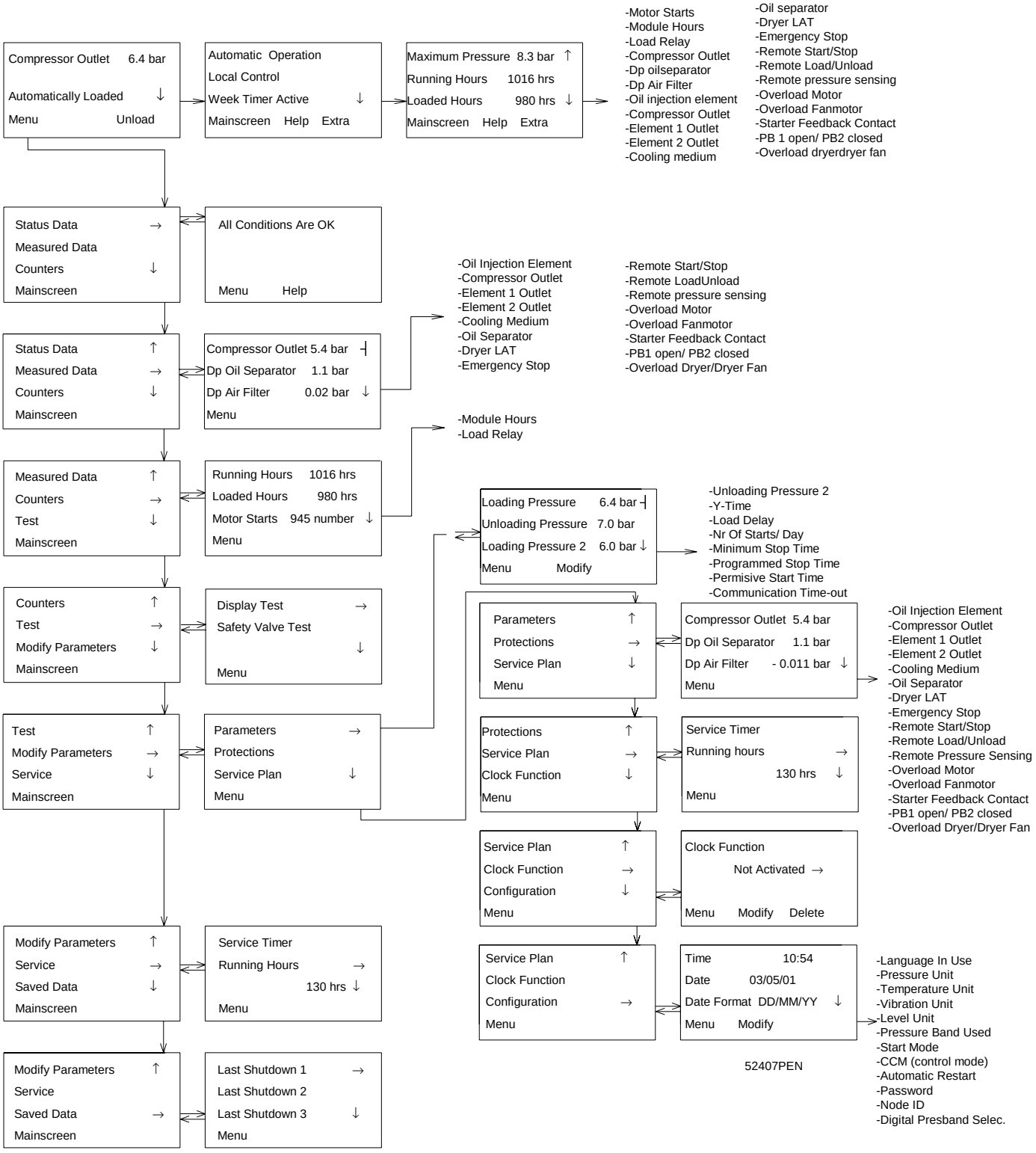


Fig. 1.11 Menu flow

Program/ Function	Description
Counters	Calling up the: - running hours - number of motor starts - regulator (module) hours
Test	Allows a display test.
Modify parameters	Modifying the settings for: - parameters: loading and unloading pressures - protections: compressor outlet pressure, air filter pressure drop, ... (see Fig. 1.11) - service plans: timers for service plans - clock functions: automatic compressor start/stop/pressure band commands - configuration: time, date, display language, …
Service	Calling up service plans and resetting the timers after carrying out the service actions belonging to a plan. See section 4.
Saved data	Calling up the saved data: last shut-down, last emergency stop data

1.5.2 Main screen

When the voltage is switched on, the main screen is shown automatically, showing in short the operation status of the compressor.

Compressor Outlet		7.0 bar
Automatically loaded		↓
Menu		
F1	F2	F3

Fig. 1.12 Main screen, typical example

If the function keys or arrow keys are not used for some minutes, the display will automatically return to the Main screen.

Whenever displayed on a submenu screen, press the key Mainscreen to return to the Main screen.

Footnotes chapter 1

1) GA/GA W 90 up to 160 have one compressor element and one unloader. GA/GA W 200 up to 315 have two compressor elements, each provided with an unloader, check valve and oil stop valve.

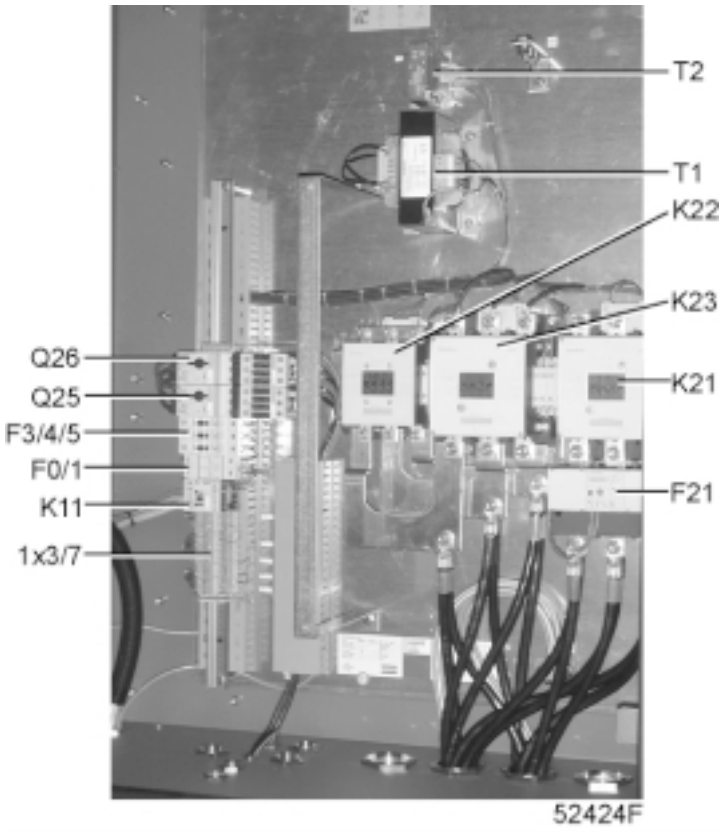
2) GA90 and GA110 are provided with one fan. GA132 up to GA315 are provided with two fans.

1.5.3 External compressor status indication

Terminal strip (1X7-Fig. 1.13) is provided with auxiliary contacts for external indication of:

Indication	Relay	Terminals on strip 1X7	Max. load
Automatic operation	K07	11-12	10 A / 230 V AC
Warning	K08	13-14	10 A / 230 V AC
Shut-down	K09	15-16	10 A / 230 V AC
Compressor loading	K11	17-18	3 A / 230 V AC
Motor running	K21	19-20	6 A / 230 V AC

Warning *Stop the compressor and switch off the voltage before connecting external equipment.*

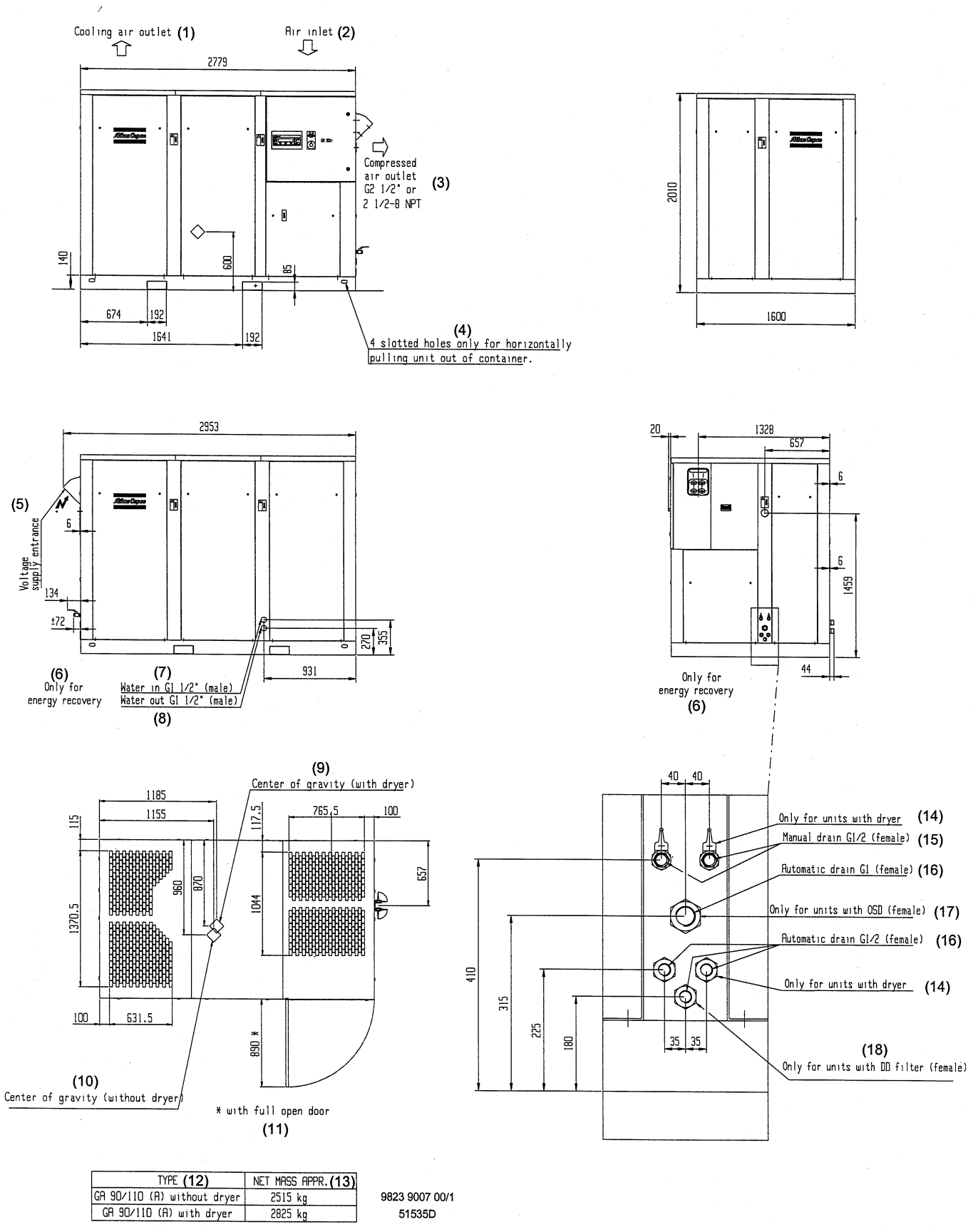


F0/1	Circuit breakers	K23	Delta contactor
F3/4/5	Circuit breakers, control circuit	Q25	Circuit breaker, fan motor M25 (GA90/315)
F21	Compressor motor overload relay	Q26	Circuit breaker, fan motor M26 (GA132/315)
K11	Auxiliary relay, loading	T1/T2	Transformers
K21	Line contactor	1X3/7	Terminal strips
K22	Star contactor		

Fig. 1.13 Electric cabinet, typical example

2 INSTALLATION

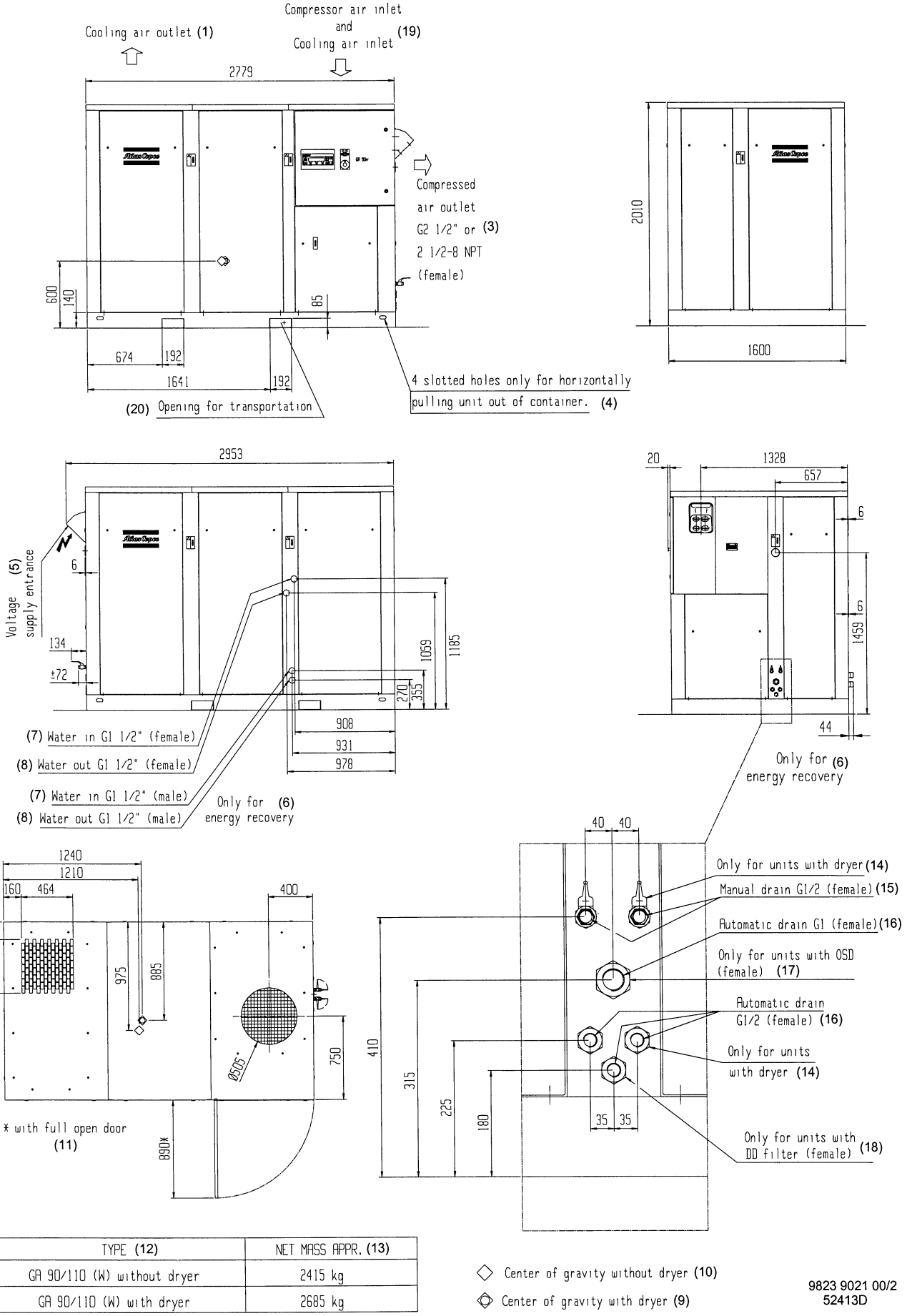
2.1 Dimension drawings



TYPE (12)	NET MASS APPR. (13)
GA 90/110 (A) without dryer	2515 kg
GA 90/110 (A) with dryer	2825 kg

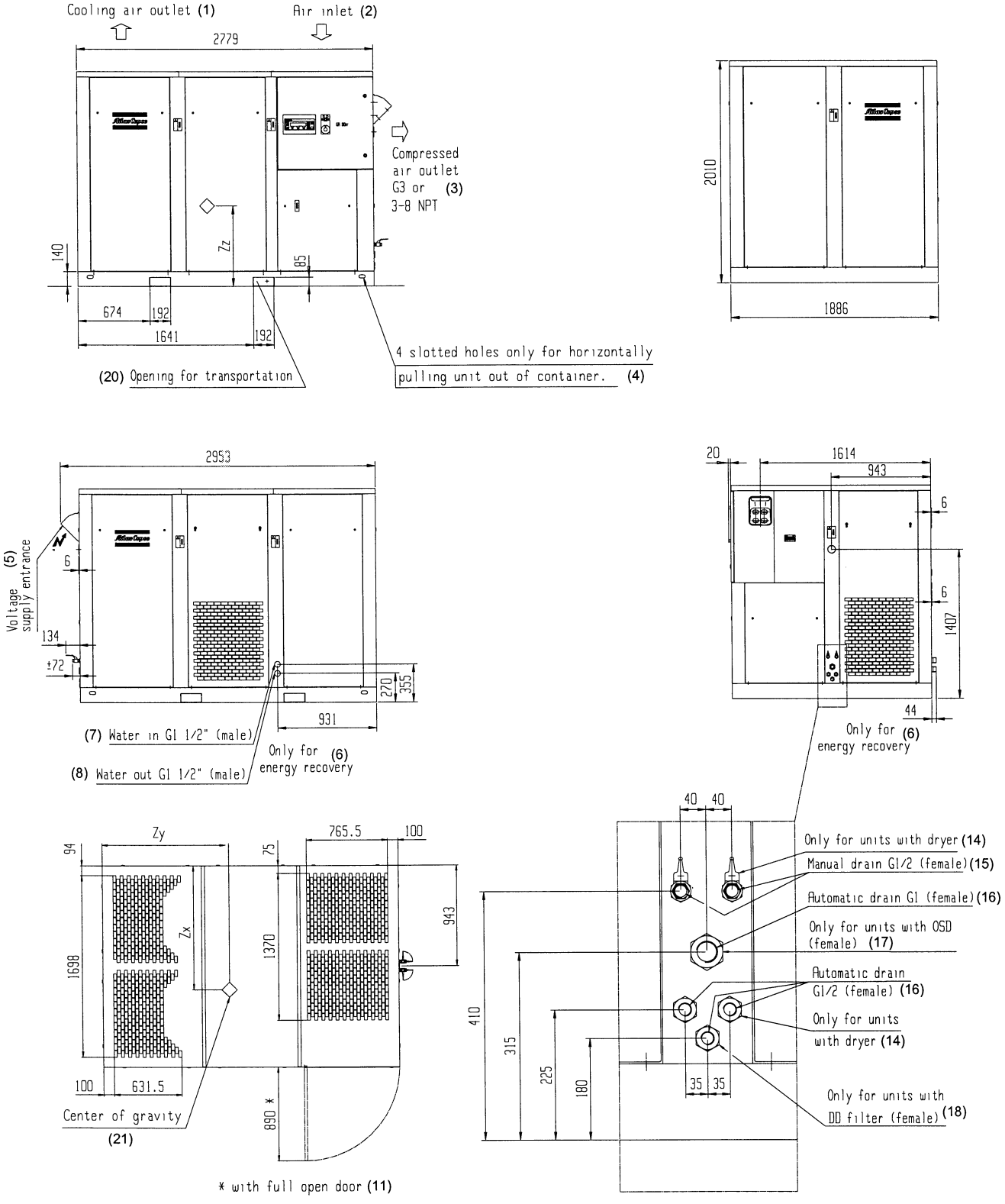
9823 9007 00/1
51535D

Fig. 2.1 Dimension drawing, GA90 and GA110



TYPE (12)	NET MASS APPR. (13)
GA 90/110 (W) without dryer	2415 kg
GA 90/110 (W) with dryer	2685 kg

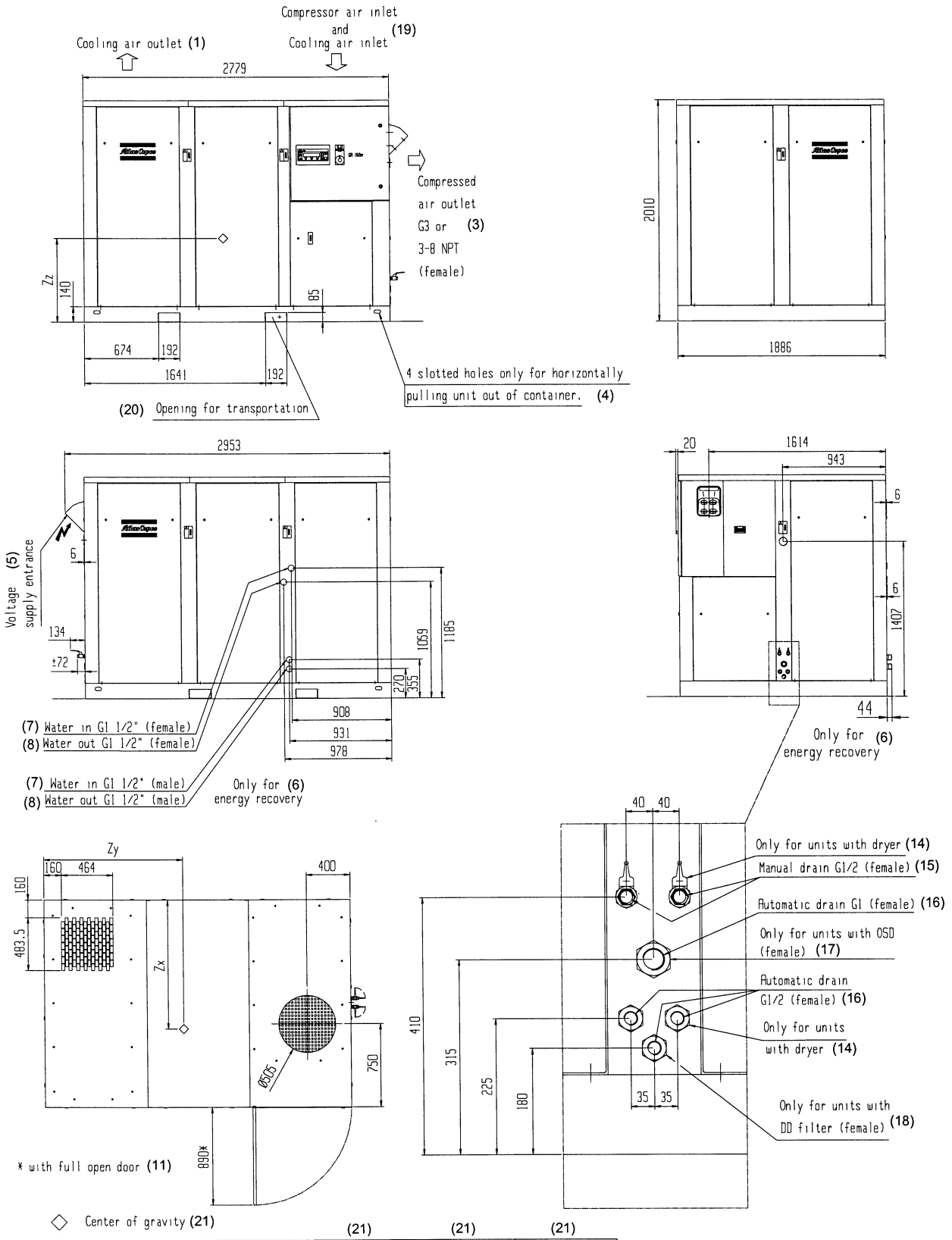
Fig. 2.2 Dimension drawing, GA90 W and GA110 W



TYPE (12)	NET MASS APPR. (kg) (13)	(21) CENTER OF GRAVITY Zx	(21) CENTER OF GRAVITY Zy	(21) CENTER OF GRAVITY Zz
GA 132/160 (A) WITHOUT DRYER	3025	1160	1185	775
GA 132/160 (A) WITH DRYER	3355	1070	1215	775
GR 110/132 (A) WITHOUT DRYER	3140	816	1083	....
GR 110/132 (A) WITH DRYER	3470	726	1113	....
GR 160/200 (A) WITHOUT DRYER	3547	808	1163	....
GR 160/200 (A) WITH DRYER	3877	718	1193	....

9823 9008 00/3
52414D

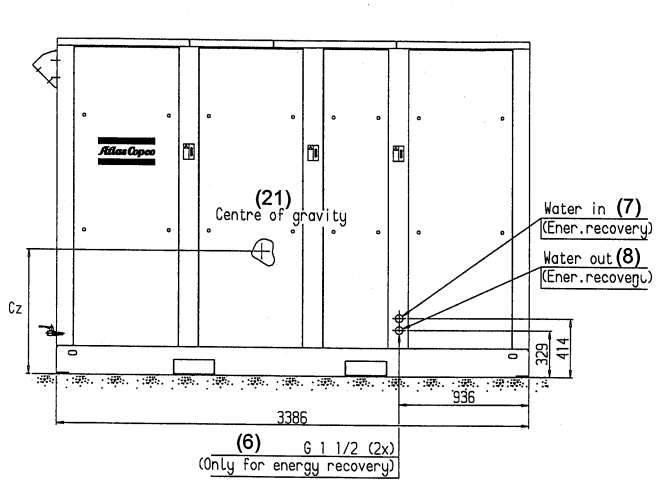
Fig. 2.3 Dimension drawing, GA132 and GA160

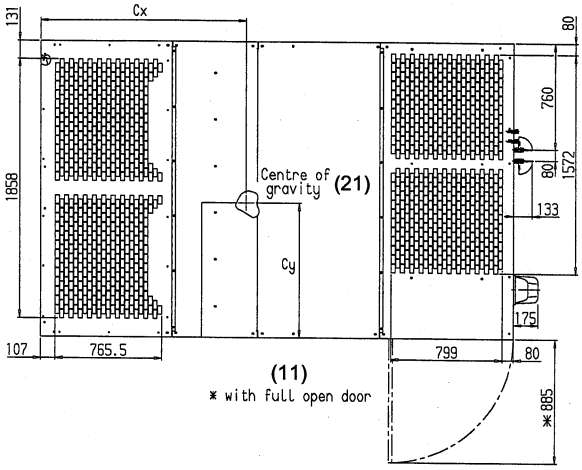


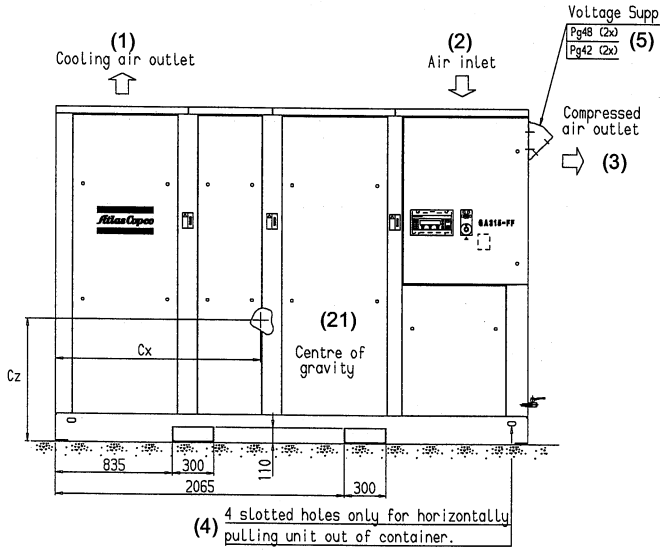
TYPE (12)	NET MASS APPR. (kg) (13)	(21) CENTER OF GRAVITY Zx	(21) CENTER OF GRAVITY Zy	(21) CENTER OF GRAVITY Zz
GA 132/160 (W) WITHOUT DRYER	2895	1180	1260	775
GA 132/160 (W) WITH DRYER	3175	1090	1290	775
GR 110/160 (W) WITHOUT DRYER	2946	817	1081	....
GR 110/160 (W) WITH DRYER	3226	727	1111	....
GR 160/200 (W) WITHOUT DRYER	3353	809	1161	....
GR 160/200 (W) WITH DRYER	3633	719	1191	....

9823 9022 00/3
52415D

Fig. 2.4 Dimension drawing, GA132 W and GA160 W







(21) CENTRE OF GRAVITY : AIR COOLED GA200-315

origin:acc. 9823 1988 00 bottom of frame, left side facing control cubicle

(23) x :Length of compressor
(24) y :width of compressor
(25) z :heigth

	TYPE (12)	(21) Centre of gravity (+/-150mm) Cx	Cy	Cz	(13) mass kg
	GA200-50Hz ABB Low voltage	1383	925	868	4727
(22)	GA250-50Hz ABB Low voltage	1440	907	847	5017
	GA200-60Hz ABB Low voltage	1383	925	868	4727
(22)	GA250-60Hz ABB Low voltage	1432	910	851	4957
	GA315-60Hz ABB Low voltage	1440	907	847	5017
	GA200-60Hz SIEMENS Low voltage	1416	910	851	4957
(26)	GA250-60Hz SIEMENS Low voltage	1453	904	844	5057
	GA315-60Hz SIEMENS Low voltage	1479	893	832	5257
(27)	GA200-315 MEDIUM VOLTAGE	1516	884	823	5407
(28)	GA200-315 without motor	1215	1009	960	3757
(29)	for feature dryer add :	86	36	15	400
(30)	for feature DD-filter add :	36	10	23	125

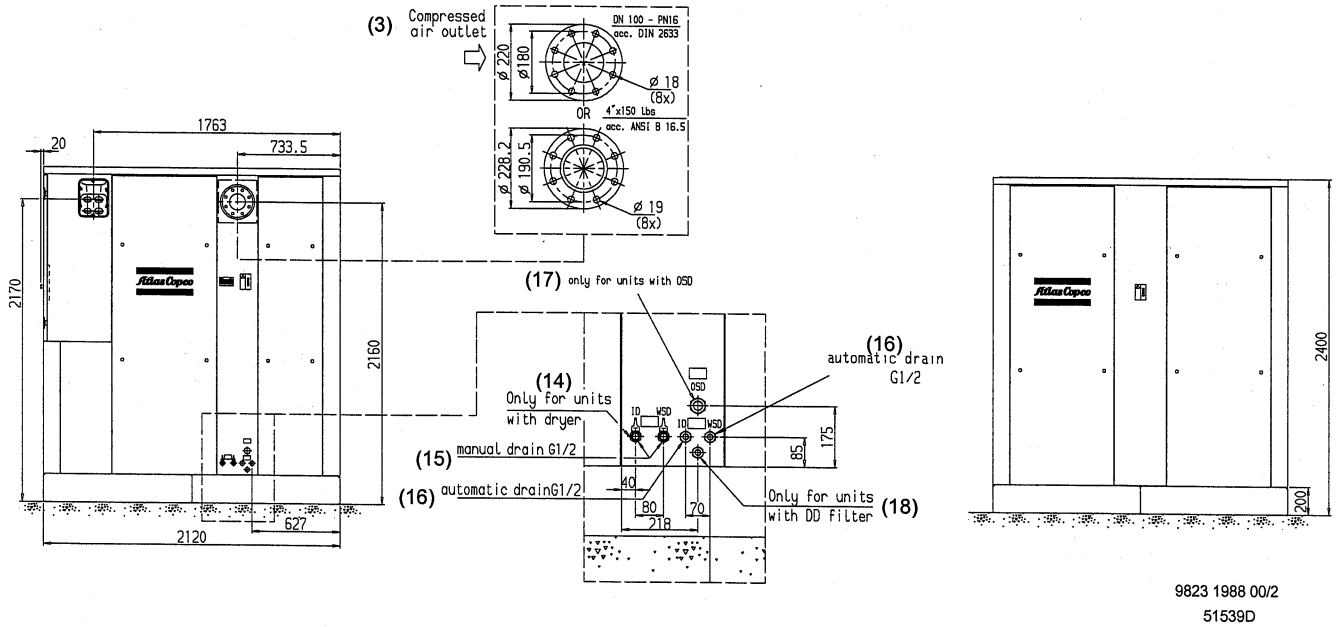


Fig. 2.5 Dimension drawing, GA200 up to GA315

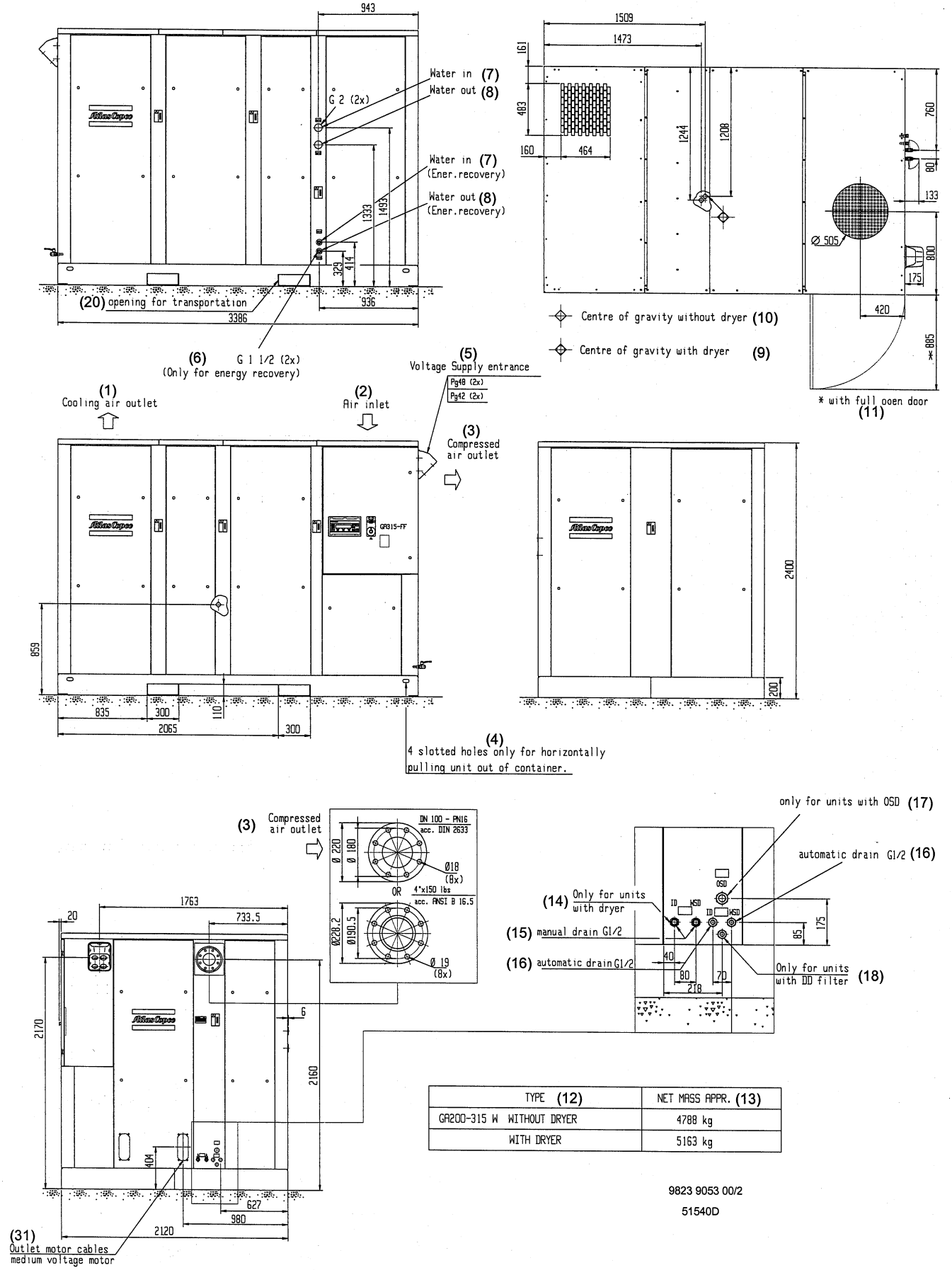


Fig. 2.6 Dimension drawing, GA200 W up to GA315 W

2.2 Installation proposals (Figs. 2.7 up to 2.10)

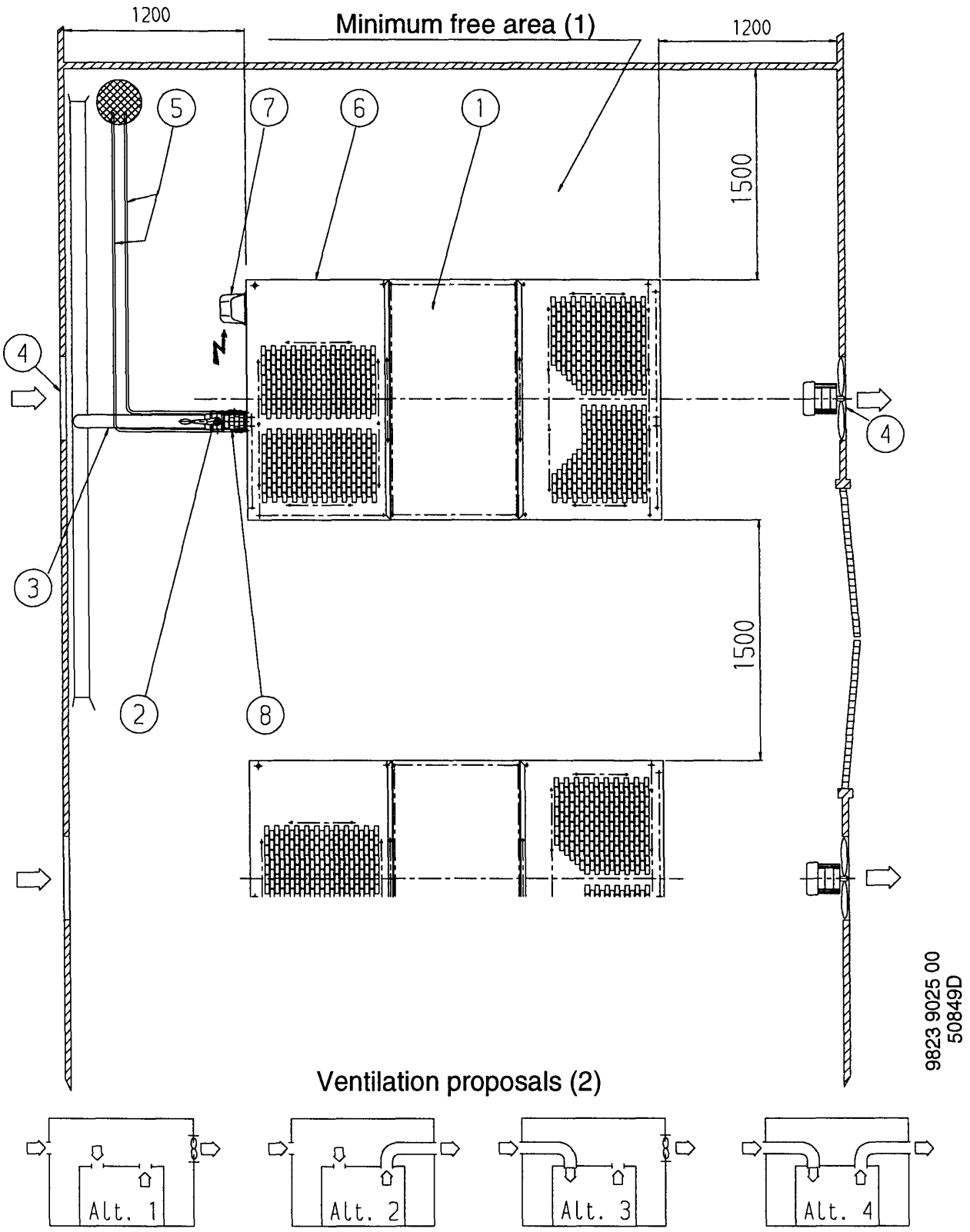


Fig. 2.7 Installation proposal, GA90 up to GA160

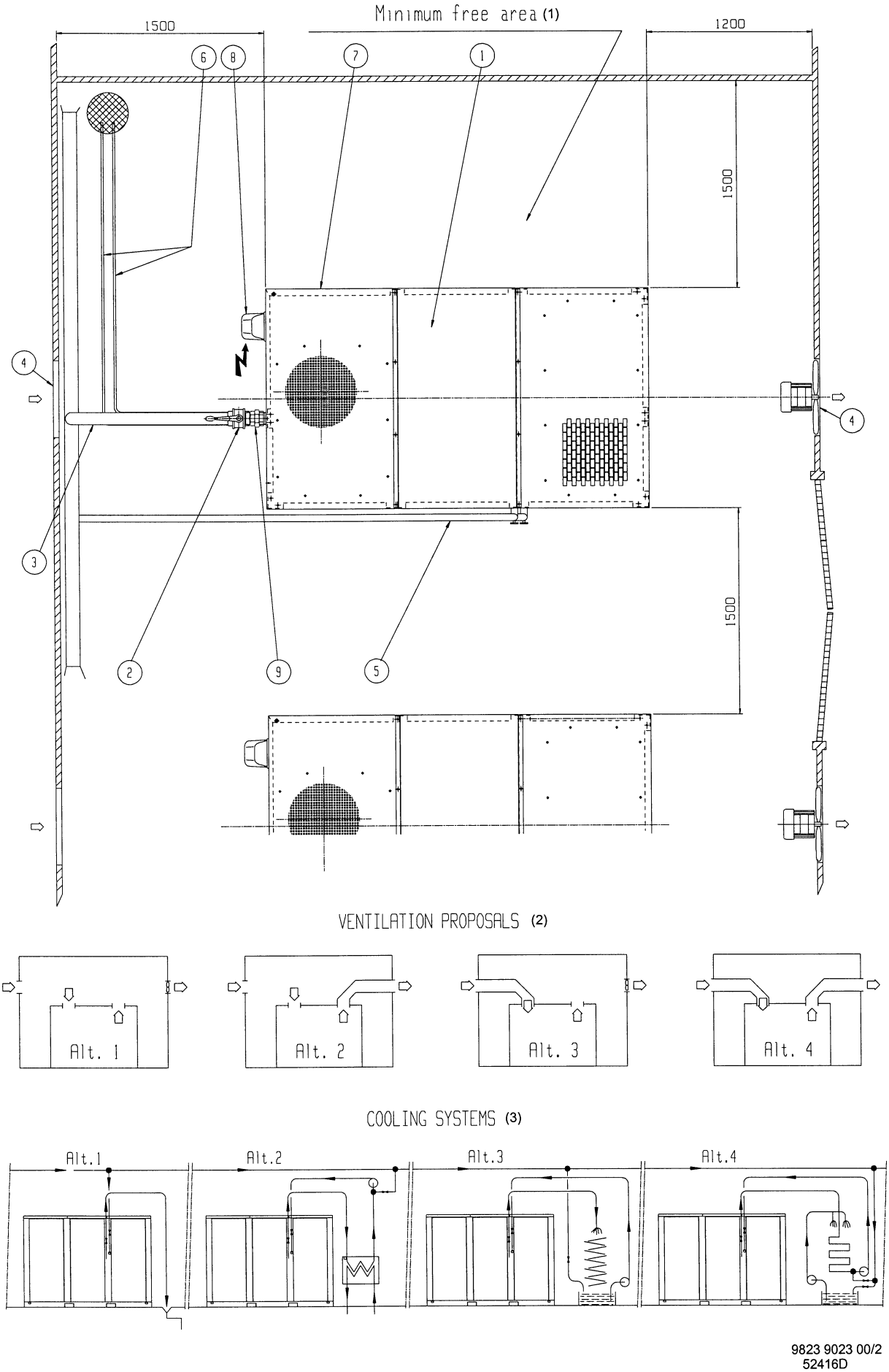


Fig. 2.8 Installation proposal, GA90 W up to GA160 W

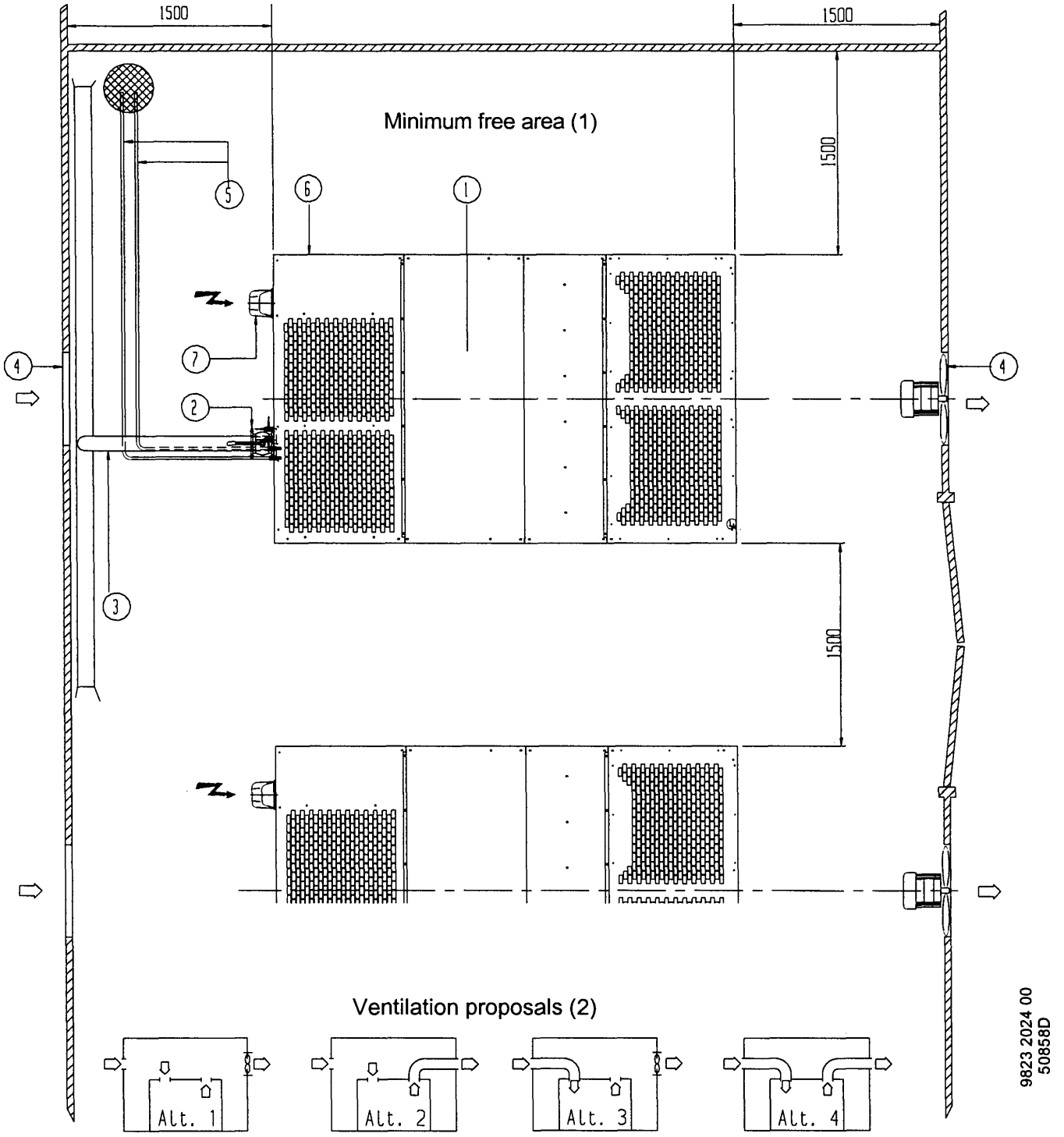


Fig. 2.9 Installation proposal, GA200 up to GA315

Ref.	Description
1	Install the compressor on a level floor suitable for taking the weight of the compressor. For ventilation proposal 1, the minimum distance between the top of the bodywork and the ceiling is 1200 mm.
2	Remove the plastic plug (if provided) from the compressor air outlet pipe (3-Fig. 3.5/7-Fig. 3.6) and fit the air outlet valve **1)** to the pipe. Close the valve and connect it to the net.

Ref.	Description
3	The pressure drop over the air outlet pipe can be calculated as follows:

$$dp = (L \times 450 \times Qc^{1.85}) / (d^5 \times p)$$

dp = pressure drop (recommended maximum = 0.1 bar)
L = length of outlet pipe in m
d = inner diameter of the outlet pipe in mm
p = absolute pressure at the compressor outlet in bar(a)
Qc = free air delivery of the compressor in l/s

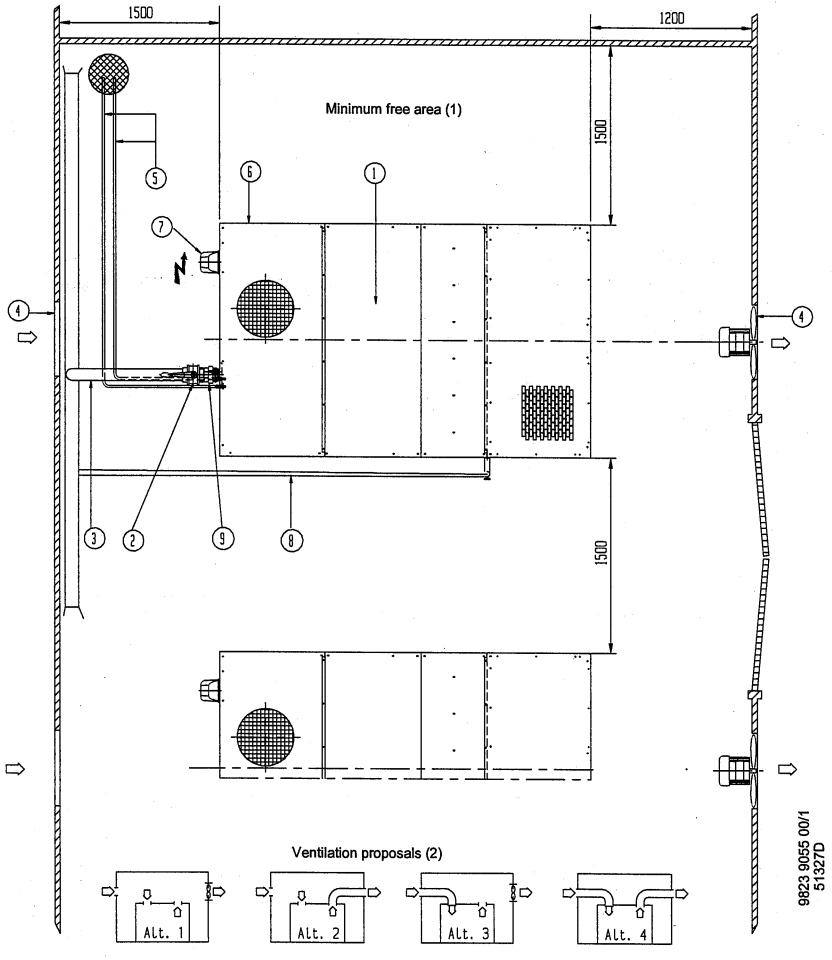


Fig. 2.10 Installation proposal, GA200 W up to GA315 W

Ref. **Description**

It is recommended that the connection of the compressor air outlet pipe is made on top of the main air net pipe to minimize carry-over of possible remainder of condensate.
As a rule of thumb, following formula can be used to calculate the recommended volume of the air net:

$V = (30 \times C \times p \times Q) / dp$

V = recommended air net volume in l
dp = pressure difference between unloading and loading pressures in bar (recommended minimum = 0.6)
p = compressor inlet pressure in bar absolute
Q = free air delivery of compressor in l/s
C = correction factor, see below

Air consumption divided by compressor air delivery	**Correction factor C**
0.9	0.10
0.8	0.15
0.7	0.20
0.5	0.25
0.3	0.20
0.2	0.15
0.1	0.10

4 The inlet grids and ventilation fan should be installed in such a way that any recirculation of cooling air to the compressor is avoided. The maximum air velocity through the grids is 5 m/s.

The required ventilation to limit the compressor room temperature can be calculated as follows:

$Qv = 0.92\ N/dT$ (GA) $\quad Qv = 0.1\ N/dT$ (GA W)

Qv = required ventilation capacity in m^3/s
N = shaft input of compressor in kW
dT = temperature increase in compressor room

If cooling air ducts are installed, the maximum allowable pressure drop over the ducts is 30 Pa. The maximum pressure drop depends on the ambient temperature. The fan capacity should match the compressor fan capacity at a pressure head equal to the pressure drop caused by the cooling air outlet ducts. Consult Atlas Copco.

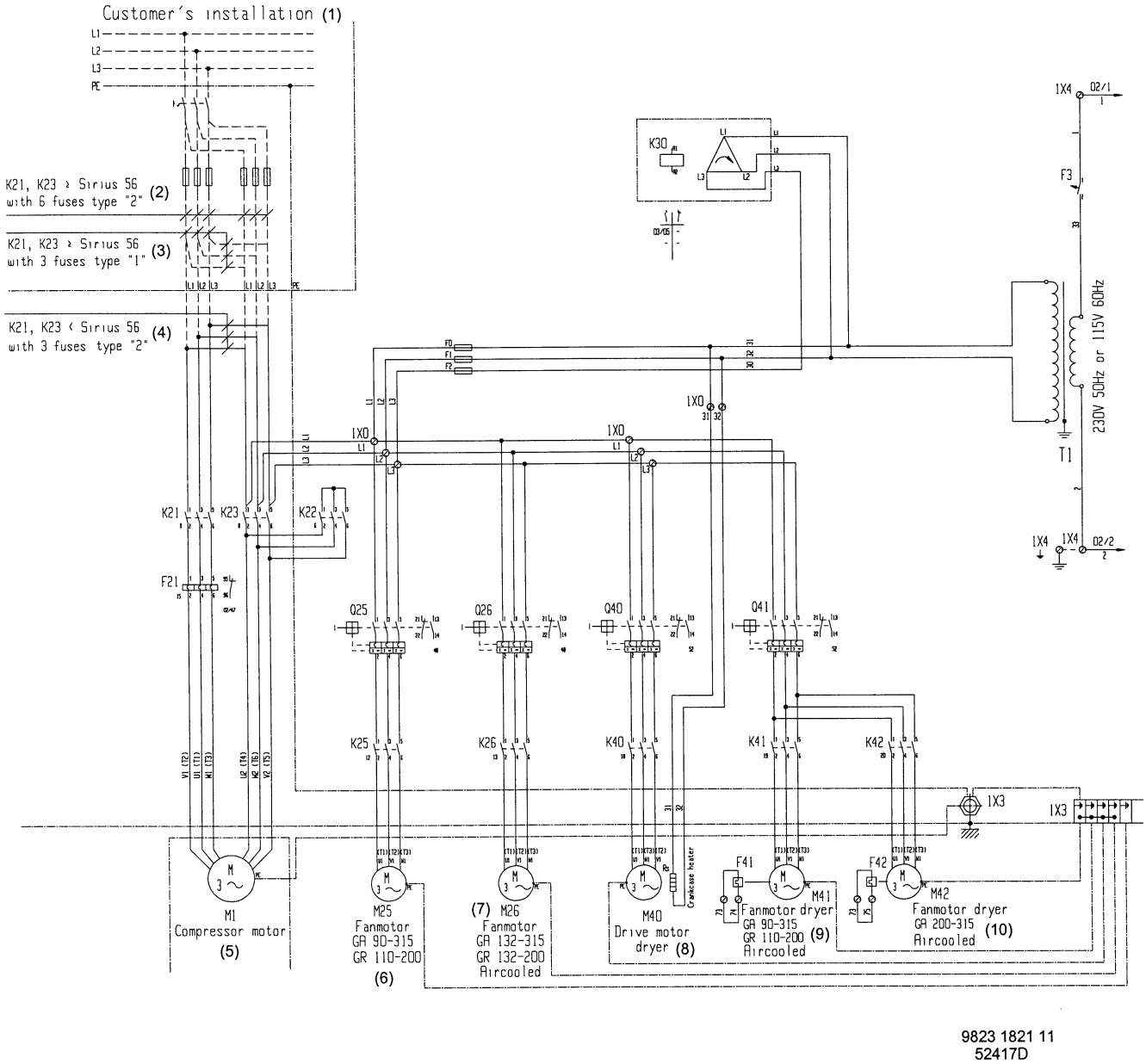
5-Fig. 2.7/2.9/2.10 - 6-Fig. 2.8
Remove the plastic plugs (if provided) from the condensate outlets (Fig. 3.7) and fit the manual condensate drain valves (1 and 2-Fig. 3.7). **2)** Lay out the drain piping towards the condensate collector. The drain pipes must not dip into the water of the drain collector. For draining of purified condensate water, an oil/water separator (type OSD) can be integrated in the bodywork. It is recommended to provide a funnel to allow visual inspection of the condensate flow.

5-Fig. 2.8 - 8-Fig. 2.10
For GA W, fit a water shut-off valve and water drain valve in the compressor water inlet pipe and outlet pipe. Remove the plastic plugs (if provided) from the compressor water pipes and connect the pipes to the cooling water circuit.

6-Fig. 2.7/2.9/2.10 - 7-Fig. 2.8
Location of the Elektronikon regulator.

7-Fig. 2.7/2.9/2.10 - 8-Fig. 2.8
See section 2.3 for the recommended size of the supply cables. Check that the electrical connections correspond to the local codes. The installation must be earthed and protected against short circuits by fuses in all phases. An isolating switch must be installed near the compressor.

8-Fig. 2.7 - 9-Fig. 2.8/2.10
Location of a pipe coupling **3)**.



F21	Compressor motor overload relay	K41	Contactor, fan motor of dryer (GA90/315 Full-feature)	M42	Fan motor, air dryer (GA200/315 Full-feature)
K21	Line contactor	K42	Contactor, fan motor of dryer (GA200/315 Full-feature)	Q25	Circuit breaker, fan motor M25 (GA90/315)
K22	Star contactor	M1	Drive motor	Q26	Circuit breaker, fan motor M26 (GA132/315)
K23	Delta contactor	M25	Fan motor, GA90/315	Q40	Circuit breaker, compressor motor of air dryer (Full-feature only)
K25	Contactor, fan motor M25 (GA90/315)	M26	Fan motor, GA132/315	Q41	Circuit breaker, fan motor(s) of air dryer (Full-feature only)
K26	Contactor, fan motor M26 (GA132/315)	M40	Compressor motor, air dryer (Full-feature only)	1X3	Earthing strip
K30	Phase sequence relay (option)	M41	Fan motor, air dryer (GA90/315 Full-feature)		
K40	Contactor, compressor motor of air dryer (Full-feature only)				

Fig. 2.11 Electrical connections (typical example)

2.3 Electric cable size

50 Hz compressors 6)

Type	230 V	400 V	500 V
GA90	2x (3x120mm²+70mm²)	3x95mm²+50mm²	3x70mm²+35mm²
GA110	2x (3x150mm²+95mm²)	3x120mm²+70mm²	3x95mm²+50mm²
GA132	2x (3x185mm²+95mm²)	2x (3x95mm²+50mm²)	3x120mm²+70mm²
GA160	2x (3x240mm²+120mm²)	2x (3x120mm²+70mm²)	2x (3x70mm²+35mm²)

Type	230 V	400 V	500 V
GA200		2x (3x150mm²+70mm²)	2x (3x120mm²+70mm²)
GA250		2x (3x185mm²+95mm²)	2x (3x150mm²+70mm²)

60 Hz IEC compressors 6)

Type	220/230 V	380 V	440/460 V
GA90	2x (3x120mm²+70mm²)	3x120mm²+70mm²	3x95mm²+50mm²
GA110	2x (3x150mm²+95mm²)	2x (3x70mm²+35mm²)	2x (3x50mm²+25mm²)
GA160		2x (3x95mm²+50mm²)	2x (3x95mm²+50mm²)

Type	220/230 V	380 V	440/460 V
GA200		2x (3x150mm²+70mm²)	2x (3x120mm²+70mm²)
GA250		2x (3x185mm²+95mm²)	2x (3x150mm²+70mm²)
GA315		2x (3x240mm²+120mm²) **4)** or 4x (3x70mm²+35mm²) **5)**	2x (3x185mm²+95mm²)

60 Hz CSA/UL compressors 7)

Type	440/460 V	575 V
GA90	3xAWG0000+AWG2	3xAWG00+AWG4
GA110	2x (3xAWG00+AWG4)	3xAWG000+AWG3
GA160	2x (3xAWG000+AWG3)	2x (3xAWG00+AWG4)

Type	440/460 V	575 V
GA200	2x (3xMCM400+AWG0) **4)** or 4x (3xAWG00+AWG4) **5)**	2x (3xMCM250+AWG2) **4)** or 4x (3xAWG1+AWG6) **5)**
GA250	2x (3xMCM500+AWG0) **4)** or 4x (3xAWG000+AWG3) **5)**	2x (3xMCM300+AWG0) **4)** or 4x (3xAWG0+AWG4) **5)**
GA315	4x (3xAWG000+AWG3) **5)**	4x (3xAWG00+AWG4) **5)**

2.4 Pictographs

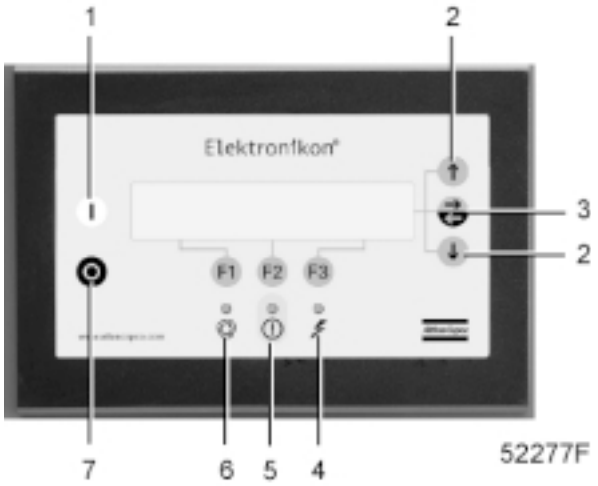


Fig. 2.12 Pictographs, control panel

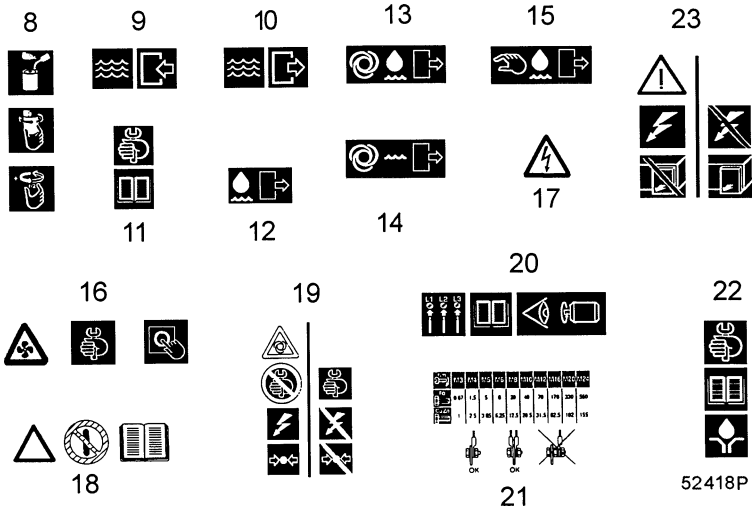


Fig. 2.13 Pictographs, other locations (typical examples)

1 Start
2 Keys to scroll through display
3 Key to go to next field on display
4 Voltage on
5 Alarm
6 Automatic operation
7 Stop
8 Oil the gaskets, screw on the filters and tighten by hand (approx. one half turn)
9 Cooling water inlet
10 Cooling water outlet
11 Consult the Instruction book before maintenance or repair
12 Condensate outlet
13 Automatic condensate drain
14 Automatic condensate drain for optional oil/water separator (type OSD)
15 Manual condensate drain
16 Stop the compressor before cleaning the coolers
17 Warning: under tension
18 Read Instruction book before starting the compressor
19 Switch off the voltage and de-pressurize the compressor before maintenance or repair
20 Before connecting the compressor electrically, consult the Instruction book for the motor rotation direction
21 Torques for steel (Fe) or brass (CuZn) bolts
22 Consult the Instruction book before greasing
23 Switch off the voltage before removing the protecting cover inside the electric cabinet

Figs. 2.12 and 2.13 Pictographs

2.5 Cooling water requirements

The cooling water quality must meet certain minimum requirements.

No general recommendation can encompass the effects of all combinations of the various compounds, solids and gases typically found in cooling water in interaction with different materials.

This recommendation is a general guide line for acceptable coolant quality.

2.5.1 Type of the system

Closed system
In a closed system, the same cooling water is circulating through a system without contact with air.

Open system
An open system is a pass-through system, or a circulating system with a cooling tower. In the latter case, the composition of the water that enters the cooler must be considered, and not the composition of the make-up water. Due to the evaporative effect in the cooling tower, much higher concentrations of ions can be obtained in the circulating water than in the make-up water.

2.5.2 Cooling water parameters

The Rysnar stability index (RSI)

The Rysnar Index (RSI) is a parameter for predicting whether water will tend to dissolve or precipitate calcium carbonate. The adhesion of scaling depositions and their effect are different on different materials, but the equilibrium of the water (scaling or corrosive) is only determined by its actual pH value and by the saturation pH value (pH_s).

The saturation pH value is determined by the relationship between the calcium hardness, the total alkalinity, the total solids concentration and the temperature.

The Rysnar Index is calculated as follows :

$RSI = 2*pH_s - pH$

where pH = measured pH (at room temperature) of water sample

pH_s = pH at saturation

The pH_s is calculated by using :

$pH_s = (9.3 + A + B) - (C + D)$

A : depends on the total solids concentration (mg/l).

B : depends on the highest cooling water temperature (°C),
For GA/GR units take T = 75°C

C : depends on the calcium hardness (ppm $CaCO_3$).

D : depends on the HCO_3^- concentration or M-alkalinity (mval/l).

The values from A, B, C and D are found in the table below.

Total dissolved solids (mg/l)	A	Temperature (°C)	B	Ca-hardness (ppm $CaCO_3$)	C	M-Alkalinity (mval/l)	D
50 - 300	0.1	0 - 1	2.6	10 - 11	0.6	0.20 - 0.22	1.0
400 - 1000	0.2	2 - 6	2.5	12 - 13	0.7	0.24 - 0.26	1.1
		7 - 9	2.4	14 - 17	0.8	0.28 - 0.34	1.2
		10 - 13	2.3	18 - 22	0.9	0.36 - 0.44	1.3
		14 - 17	2.2	23 - 27	1.0	0.46 - 0.54	1.4
		18 - 21	2.1	28 - 34	1.1	0.56 - 0.70	1.5
		22 - 27	2.0	35 - 43	1.2	0.72 - 0.88	1.6
		28 - 31	1.9	44 - 55	1.3	0.90 - 1.10	1.7
		32 - 37	1.8	56 - 69	1.4	1.12 - 1.38	1.8
		38 - 44	1.7	70 - 87	1.5	1.40 - 1.76	1.9
		45 - 50	1.6	88 - 110	1.6	1.78 - 2.20	2.0
		51 - 56	1.5	111 - 138	1.7	2.22 - 2.78	2.1
		57 - 63	1.4	138 - 174	1.8	2.80 - 3.54	2.2
		64 - 71	1.3	175 - 220	1.9	3.54 - 4.40	2.3
		72 - 80	1.2	230 - 270	2.0	4.6 - 5.4	2.4
				280 - 340	2.1	5.6 - 7.0	2.5
				350 - 430	2.2	7.2 - 8.8	2.6
				440 - 550	2.3	9.0 - 11.0	2.7
				560 - 690	2.4	11.2 - 13.8	2.8
				700 - 870	2.5	14.0 - 17.6	2.9
				880 - 1000	2.6	17.8 - 20.0	3.0

The interpretation of the values obtained is :

RSI < 6	boiler scale formation
RSI 6 - 7	neutral water
RSI > 7	corrosive water

A more detailed interpretation follows below :

RSI	Tendency of the water	Action
RSI < 3.9	Very high scale formation	*Water cannot be used*
4.0 < RSI < 5.5	High boiler scale formation	*Regular control and descaling operation necessary*
5.6 < RSI < 6.2	Slight boiler scale formation	*Water treatment not necessary* *Occasional inspection recommended*
6.3 < RSI < 6.8	Neutral water	*Water treatment not necessary* *Occasional inspection recommended*
6.9 < RSI < 7.5	Slight corrosion at higher temperature	*Water treatment not necessary* *Occasional inspection recommended*
7.6 < RSI < 9.0	Strong corrosion	*Regular control necessary, use of corrosion inhibitor recommended*
9.1 < RSI < 11	Very strong corrosion	*Regular control necessary, use of corrosion inhibitor required*
RSI > 11	Very strong corrosion in complete water system	*Water should not be used*

This table indicates that distilled or demineralised water should never be used, as their RSI is > 11.

The RSI only indicates the equilibrium of scaling – descaling. A cooling water showing good RSI conditions can still be unsuitable due to other factors.

From the table above, the RSI index should be between 5.6 and 7.5, otherwise contact a specialist.

pH

The effect of pH is already calculated in the Rysnar index, but the pH itself has some additional limitations : 6.8 < pH

Total dissolved solids (TDS)

This is the sum of all ions in the water. It can be derived from the dry residue after evaporation (but not including suspended solids), or it can be estimated from the electrical conductivity.

In a closed system, the following limits apply: TDS < 3000 mg/l (< 3800 µS/cm)

For an open system, the following limits apply: TDS < 450 mg/l (< 580 µS/cm)

Chlorides (Cl^-)

Chloride ions will create pitting corrosion on stainless steel. Their concentration should be limited :

Closed cooling system : Chlorides < 500 ppm
Open cooling system : Chlorides < 150 ppm

However, if the water is scaling, lower limits should be used. (See The Rysnar stability index (RSI)).

Free chlorine (Cl_2)

Continuously, a level of 0.5 ppm should not be exceeded. For shock treatments, a maximum limit of 2 ppm for maximum 30 minutes/day applies.

Sulphates ($SO4^{--}$)

Closed cooling system : Sulphates < 400 ppm
Open cooling system : Sulphates < 150 ppm

Carbonate hardness

Closed cooling system : 50-1000 ppm $CaCO_3$
Open cooling system : 50-500 ppm $CaCO_3$

HCO_3^- / SO_4^{2-} should be >1

Ammonia

< 0.5 ppm

Copper

< 1 ppm

Iron and Manganese

< 1 ppm

Organics

No algae.
No oil.

Suspended solids

Non-soluble particles, size < 1mm.
< 10 ppm

Footnotes chapter 2

1) To be provided by the customer.
2) GA Full-feature (provided with an integrated dryer) have two condensate traps and two drain valves. Compressors without dryer have one trap and one valve.
3) Available as an option.
4) Split up in 2 cables connected to line and delta contactor.
5) Split up in 2x 2 cables connected to line and delta contactor.
6) For PVC cable (70 degrees Celsius), at ambient of 40 degrees Celsius.
7) For PVC cable (90 degrees Celsius), at ambient of 40 degrees Celsius.

3 OPERATING INSTRUCTIONS

3.1 Initial start-up

3.1.1 Safety precautions

The operator must apply all related safety precautions including those mentioned in this book.

3.1.2 User manual

Read the "User manual for Elektronikon regulator " to familiarize yourself with all regulator functions.

3.1.3 Outdoor/altitude operation

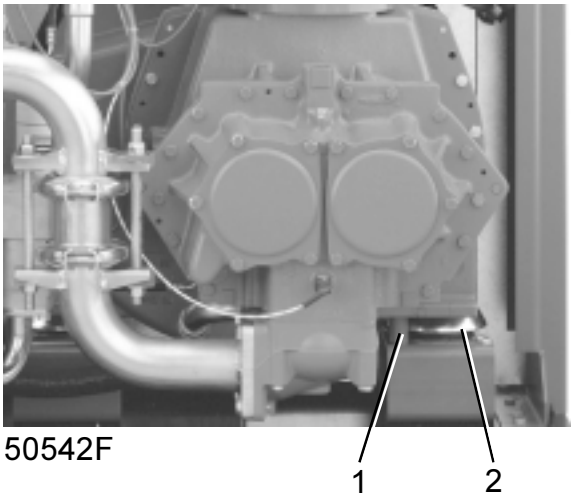
If the compressor is installed outdoors or if the air inlet temperature can be below 0 degrees Celsius, precautions must be taken. In this case, and also if operating at high altitude, consult Atlas Copco.

3.1.4 Moving/lifting

The compressor can be moved by a lift truck using the slots in the frame. Make sure that the forks protrude from the other side of the frame. The compressor can also be lifted after inserting beams in the slots. Make sure that the beams cannot slide and that they protrude from the frame equally. The chains must be held parallel to the bodywork by chain spreaders in order not to damage the compressor. The lifting equipment must be placed in such a way that the compressor will be lifted perpendicularly. Lift smoothly and avoid twisting.

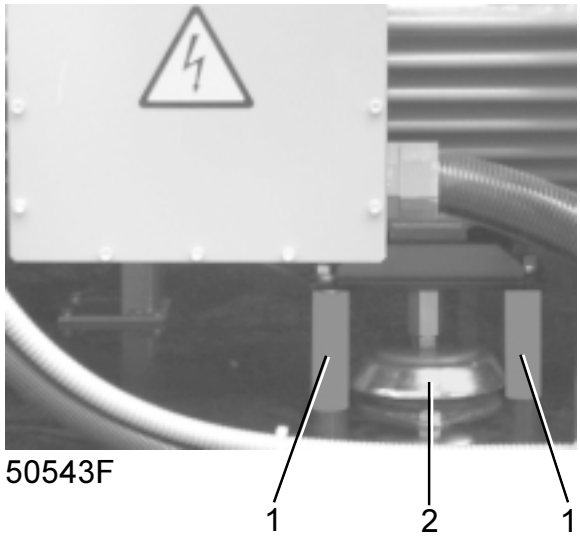
3.1.5 Initial start-up

1. Consult section 2 for the electric cable size, installation proposals and dimension drawings.
2. Read the "User manual for Elektronikon® regulator" to familiarize yourself with all regulator functions.
3. A sticker dealing in short with the operation instructions is delivered with the literature set. Affix the sticker next to the control panel.
4. Stick labels near the control panel warning the operator that:
   - the compressor may automatically restart after voltage failure
   - the compressor is automatically started and stopped
   - the compressor may be remotely controlled
5. A number of VCI (Volatile Corrosion Inhibitor) plates are provided inside the bodywork to protect the compressor against corrosion. Remove the plates.



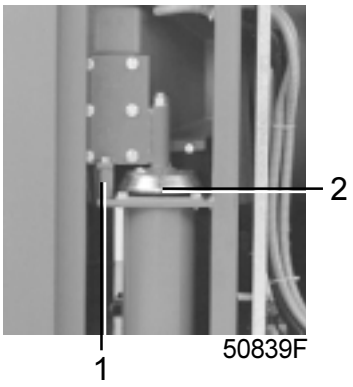
1 Bush (to be removed)
2 Vibration damper

Fig. 3.1 Transport fixations, gear casing of GA/GA W 90/160



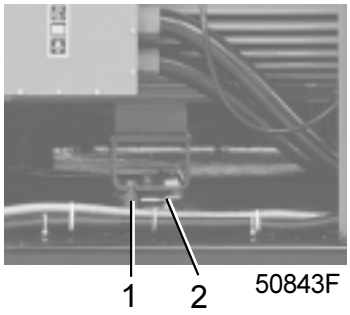
1 Bush (to be removed)
2 Vibration damper

Fig. 3.2 Transport fixations, drive motor of GA/GA W 90/160



1 Bush (to be removed)
2 Vibration damper

Fig. 3.3 Transport fixations, gear casing of GA/GA W 200/315

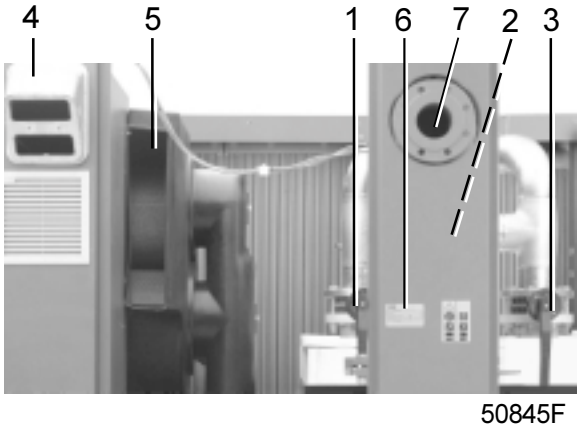


1 Bushes (to be removed)
2 Vibration damper

Fig. 3.4 Transport fixations, drive motor of GA/GA W 200/315

6. The gear casing supports, motor support and air receiver supports are secured to the frame, immobilizing the vibration dampers during transport.
   For GA/GA W 90 up to GA/GA W 160, remove bushes (1-Fig. 3.1) from both gear casing supports as well as bushes (1-Fig. 3.2) from the motor support. Also remove the bushes (or transport bolts) fitted next to the air receiver supports.
   For GA/GA W 200 up to GA/GA W 315, remove bushes (1-Fig. 3.3) from both gear casing supports as well as bushes (1-Fig. 3.4) from the motor support. Also remove the bushes fitted next to the air receiver supports.
7. Check the wires at transformer (T1-Fig. 1.13) for correct connection, the settings of overload relay (F21) and circuit breakers (Q25/26/40/41) **1) 7)**, and that overload relay (F21) is set for automatic resetting. See section 7.4.
8. Remove filler plugs (6-Figs. 1.5/1.6). Pour approx. 1 l of oil into the compressor elements. Reinstall the plugs.
9. Close drain valves (1 and 2-Fig. 3.7). **2)**
10. **For GA W**, check that the cooling water drain valves **6)** in the inlet and outlet lines are closed and that the water shut-off valves **6)** are open. Open the water regulating valve (4-Fig. 3.10) and check for water flow.
11. Check that the compressor is filled with oil: the pointer of oil level indicator (4-Fig. 3.11) should be in the green range.

12. **For GA Full-feature**, check that valve (2-Figs. 1.3/3.6) is closed and that valves (1 and 3-Figs. 1.3/3.6) are open.
13. For compressors provided with an OSD oil/water separator **5)**: fill the vessel with water to the level of the water outlet and re-install the cover.
14. Switch on the voltage. Start the compressor and stop it immediately. Check the rotation direction of the drive motor (M1-Figs. 1.1 and 1.2) while the motor is coasting to a stop. If the rotation direction is wrong, switch off the voltage and reverse two incoming electric lines.
    The correct direction of rotation is indicated for the drive motor by arrow (9-Figs. 1.5/1.6) on the gear casing and for the fan motors by arrows (15-Fig. 1.2) on the motor housings.



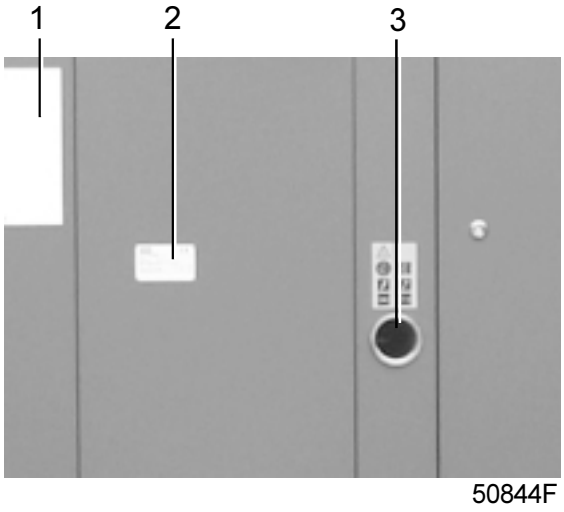
1 By-pass valve
2 By-pass valve
3 By-pass valve
4 Voltage supply inlet
5 Air inlet
6 Data plate
7 Location of air outlet valve

Fig. 3.6 Air inlet/outlet and dryer by-pass valves, GA200/315

3.2 Before starting

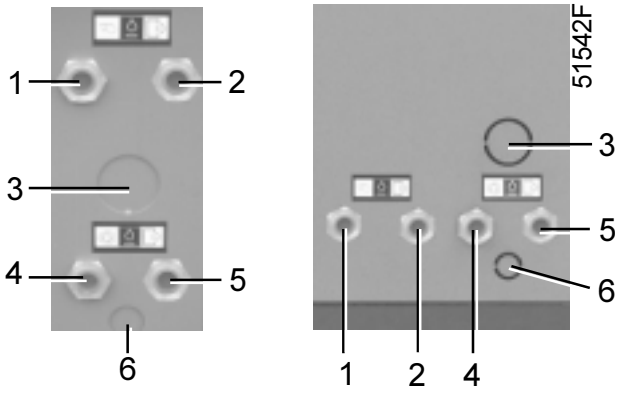
Attention
- The operator must apply all relevant safety precautions, including those mentioned in this instruction book.
- In case the water system was drained (see section 3.7), close the drain valves.

1. Switch on the voltage. Voltage on LED (6-Fig. 3.8) lights up.
2. Close condensate drain valves (1 and 2-Fig. 3.7). **2)**
3. Open air outlet valve (3-Fig. 3.5/7-Fig. 3.6).
4. Check oil level indicator (4-Fig. 3.11): the pointer should be in the green or orange range **4)**.
5. **For GA Full-feature** (provided with an integrated dryer), check that valve (2-Fig. 1.3/3.6) is closed and that valves (1 and 3-Fig. 1.3/3.6) are open.
6. **On GA W** open the water shut-off valves **6)** and regulating valve (4-Fig. 3.10).



1 Voltage supply inlet
2 Data plate
3 Location of air outlet valve

Fig. 3.5 Air outlet, GA90/160



1 Manual condensate drain
2 Manual condensate drain (Full-feature only)
3 Automatic condensate drain for optional oil/water separator (type OSD)
4 Automatic condensate drain
5 Automatic condensate drain (Full-feature only)
6 Automatic drain for optional DD filter

Fig. 3.7 Location of condensate outlets

3.3 Starting

1. Press start button (1-Fig. 3.8). The compressor starts running in unloaded condition. Automatic operation LED (8) lights up.
2. Approx. 10 seconds later (programmable), the compressor starts running loaded. The message on display (2) changes from <<Automatically unloaded>> to <<Automatically loaded>>.

On GA W also:

3. Regulate the cooling water flow (using valve 4-Fig. 3.10) **with the compressor running loaded**. Adjust the water flow to obtain the most suitable air temperature at the outlet of the compressor elements, i.e. between 2 and approx. 7 degrees Celsius above the relevant temperature in Fig. 3.9.

Attention

- For optimum operation, the cooling water outlet temperature must never exceed the value specified in section 7.5.
- Consult Atlas Copco if condensate should be formed during frequent unloading periods.

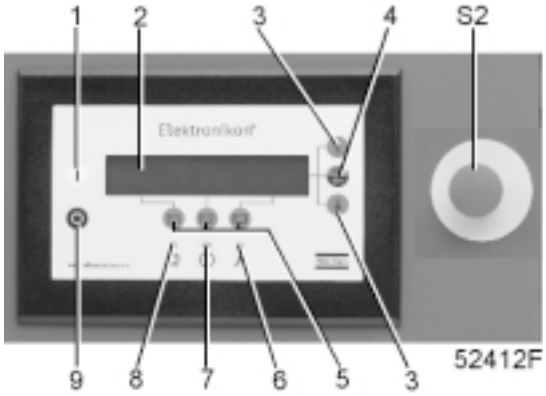


Fig. 3.8 Control panel

3.4 During operation

1. When automatic operation LED (8-Fig. 3.8) is alight, starting and stopping of the motor is controlled automatically.
2. Check the readings on display (2-Fig. 3.8). See section 3.5.
3. To unload the compressor manually, press key <<Unload>> (5-Fig. 3.8) **8)**. To put the compressor back into automatic operation, press key <<Load>> (5) **8)**.
4. **For GA Full-feature** provided with an OSD oil/water separator: regularly check that the vessel is filled; if necessary, gently top up with water to the level of the water outlet and re-install the cover.

Important

- If the compressor is stopped, it may start automatically. See also section 1.3.1.

3.5 Checking the display (2-Fig. 3.8)

1. Regularly check the display for readings and messages. Normally, the main screen (Fig. 1.12) is shown, indicating the compressor outlet pressure, the status of the compressor and the functions of the keys below the display.
2. Always check the display and remedy the trouble if alarm LED (7) is alight or blinks. See section 1.3. Also consult the "User manual for Elektronikon regulator", section "Submenu STATUS DATA".
3. The display will show a service message if a service plan interval has been exceeded or if a service level for a monitored component has been exceeded. Carry out the service actions of the indicated plans or replace the component and reset the relevant timer. Consult your Atlas Copco Customer Centre. See also section 4.1.

Warning *Before carrying out any maintenance, repair or adjustment, stop the compressor, press emergency stop button (S2-Fig. 3.8) and switch off the voltage. Close the air outlet valve and open the manual condensate drain valve(s).* ***3)***

4. Regularly check the actual compressor status by pressing the ↓ key from the main screen.

3.6 Manual unloading/loading (Fig. 3.8) 8)

Normally, the compressor runs in automatic operation, i.e. the electronic regulator loads, unloads, stops and restarts the compressor automatically. LED (8) is then alight.

Manually unloading

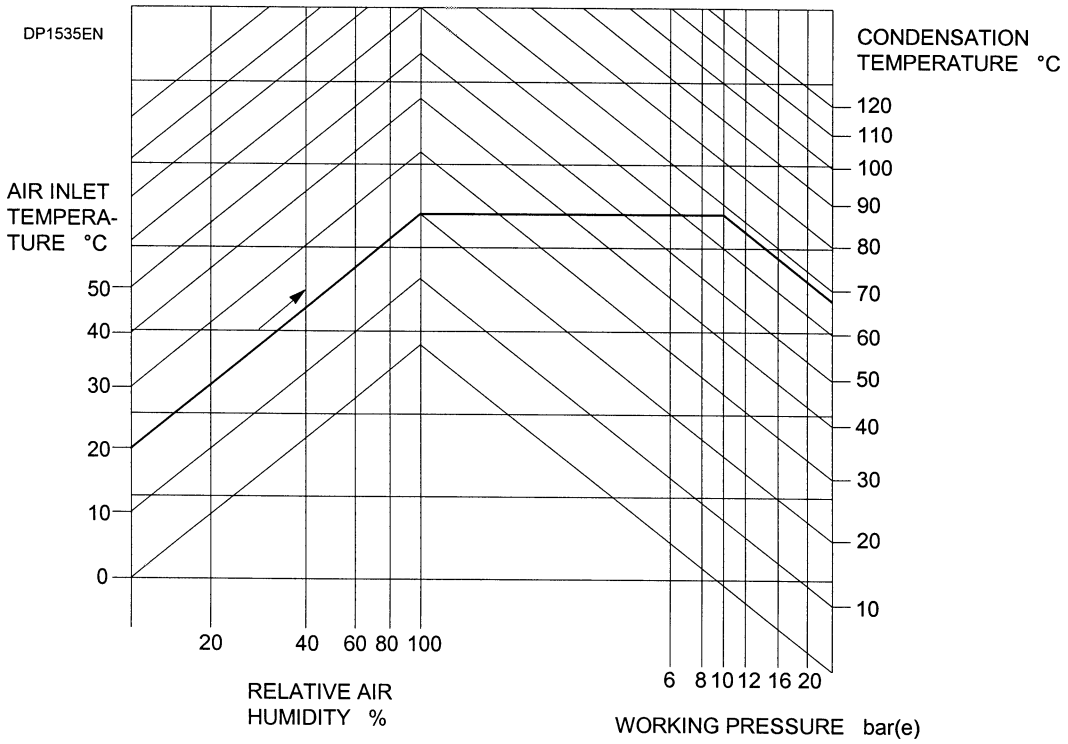
Press key <<Unload>> (5). LED (8) goes out. The message <<Manually Unloaded>> appears on the display. The compressor remains running unloaded unless it is loaded again manually.

Manually loading

Press key <<Load>> (5). LED (8) lights up. The command <<Load>> does not force the compressor in loaded condition, but it will switch the compressor to automatic operation again: the compressor will be loaded if the air net pressure drops below the programmed level.

3.7 Stopping

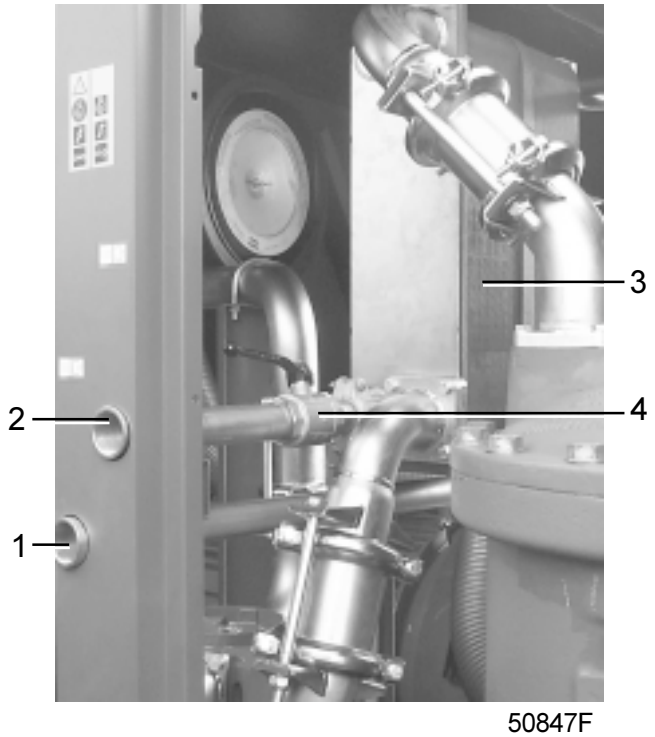
1. Press stop button (9-Fig. 3.8). LED (8) goes out. The message <<Programmed stop>> appears. The compressor runs unloaded for 30 seconds and then stops.



Example: ambient temperature 20 degrees Celsius, relative humidity 100 % and working pressure 10 bar(e). The minimum allowable temperature at the outlet of the compressor elements is 68 degrees Celsius. Regulate the cooling water flow to obtain a temperature between 70 and approx. 75 degrees Celsius at the outlet of the compressor elements.

Fig. 3.9 Minimum allowable air temperature at outlet of compressor elements (for water-cooled compressors)

2. **To stop the compressor in case of emergency**, press button (S2-Fig. 3.8). Alarm LED (7) blinks. After remedying the fault, unlock the button by pulling it out.
3. Close air outlet valve (3-Fig. 3.5/7-Fig. 3.6).
4. Open condensate drain valves (1 and 2-Fig. 3.7). **2)**
5. **On GA W**, close the water shut-off valves **6)**.
6. **On GA W, if the compressor is installed in a room where freezing temperatures are expected**, drain the cooling system by opening the drain valves in the water inlet and outlet pipes (customer's installation).
7. Switch off the voltage.



1 Water outlet
2 Water inlet
3 Combined oil and air coolers
4 Regulating valve, water flow

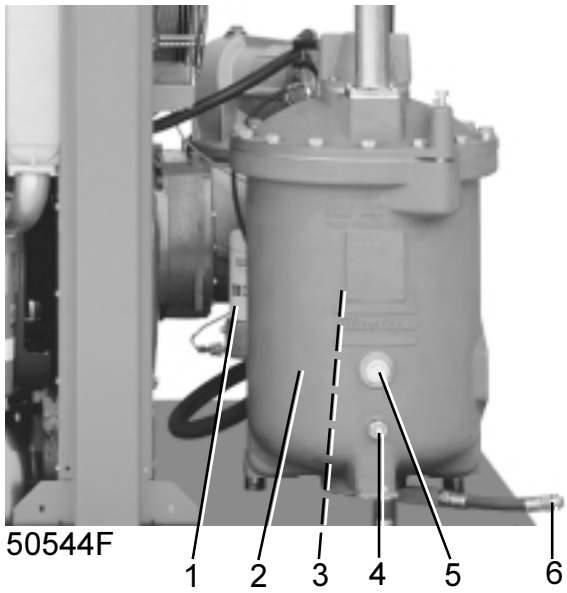
Fig. 3.10 Water system of GA W (typical example)

Important
- After pressing stop button (9), the compressor will run unloaded for 30 seconds. The compressor stops after this period. A start command during this period is ignored.
- After stopping, the compressor is prevented from restarting within a programmable time (20 seconds). A start command given during this minimum stop time will be memorized; automatic operation LED (8) lights up. The compressor will start when the minimum stop time has run out.

3.8 Taking out of operation

At the end of the service life of the compressor, proceed as follows:

1. Stop the compressor and close the air outlet valve.
2. Switch off the voltage and disconnect the compressor from the mains.
3. Depressurize the compressor by opening valves (1 and 2-Fig. 3.7) **2) 3)** and loosening plug (5-Fig. 3.11) one turn.
4. Shut off and depressurize the part of the air net which is connected to the outlet valve. Disconnect the compressor air outlet pipe from the air net.
5. Drain the water, oil and condensate circuits.
6. Disconnect the compressor condensate piping from the condensate drain net.
7. Disconnect the cooling water pipes from the compressor.



1 Oil filters
2 Air receiver
3 Oil separator element
4 Oil level sight-glass
5 Oil filler plug
6 Oil drain plug

Fig. 3.11 Air receiver

Footnotes chapter 3

1) GA90 and GA110 have one fan motor and circuit breaker, GA132 up to GA315 have two fan motors and circuit breakers.
2) GA Full-feature (provided with an integrated dryer) have two condensate traps and two drain valves. Compressors without dryer have one trap and one valve.
3) On compressors with optional OSD separator, a valve is fitted underneath the condensate trap. Close the valve after repairing.
4) If the compressor has only just stopped, wait one minute before checking the level.
5) Available as an option.
6) Customer's installation.
7) GA W are equipped with a ventilation fan in the roof. Check that it withdraws heat from the bodywork.
8) If the <<Load>> or <<Unload>> function is not indicated on the bottom line of display (2-Fig. 3.8), press key <<Menu>> (5) until function <<Main Screen>> appears above key (F1), then press key <<Main Screen>>.

4 MAINTENANCE

Warning *Before carrying out any maintenance, repair or adjustment, stop the compressor, press emergency stop button (S2-Fig. 3.8) and switch off the voltage. Close the air outlet valve and open the manual condensate drain valve(s).* ***1)***

Take precautions to avoid an accidental restart. Apply all relevant safety precautions, including those mentioned in this book.

4.1 Preventive maintenance schedule for the compressor 2)

4.1.1 Regular service operations

To ensure safe operation and long service life carry out following operations at the interval (period or running hours) which comes first. The "longer interval" checks must also include the "shorter interval" checks.

The local Atlas Copco Customer Centre may overrule the maintenance schedule depending on the environmental and working conditions of the compressor.

Period	Running hours	Operation
Daily	**8**	Check readings on display
Daily	**8**	Check that condensate is discharged during loading
Daily	**--**	Check oil level. Before starting, the level should be in the middle of the sight-glass
3-monthly	--	Clean compressor
3-monthly	--	Check for possible leaks
3-monthly	**500**	Check coolers; clean if necessary

4.1.2 Service kits

Atlas Copco Customer Centres will be glad to provide you with a wide range of service kits. Service kits comprise all parts needed for servicing components and offer the benefits of genuine Atlas Copco parts while keeping the maintenance budget low. See also section 4.7.

4.1.3 Service agreements

Atlas Copco Customer Centres have a range of service agreements to suit your needs:

- An Inspection plan
- A Preventive maintenance plan
- A Total responsibility plan

Contact your Customer Centre to agree on a tailor-made service agreement. It will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

4.1.4 Service plan

A number of service operations are grouped (called Level A, Level B, Level C, ...). Each level stands for a number of service actions to be carried out at the time intervals programmed in the Elektronikon regulator.

When reaching a level, a message will appear on the screen. After carrying out all service actions, the interval timers are to be reset using the key "Reset" in menu "Service". Consult your Atlas Copco Customer Centre.

4.2 Motor greasing

4.2.1 Fan motors on GA

GA132 up to GA315 have two fan motors (M25/26-Fig. 1.6). GA90 and GA110 have one fan motor (M25-Fig. 1.5). The bearings of the fan motor(s) are greased for life. Contact your Customer Centre for the replacement interval of the motor bearings.

4.2.2 Drive motor (M1-Figs. 1.1/1.2)

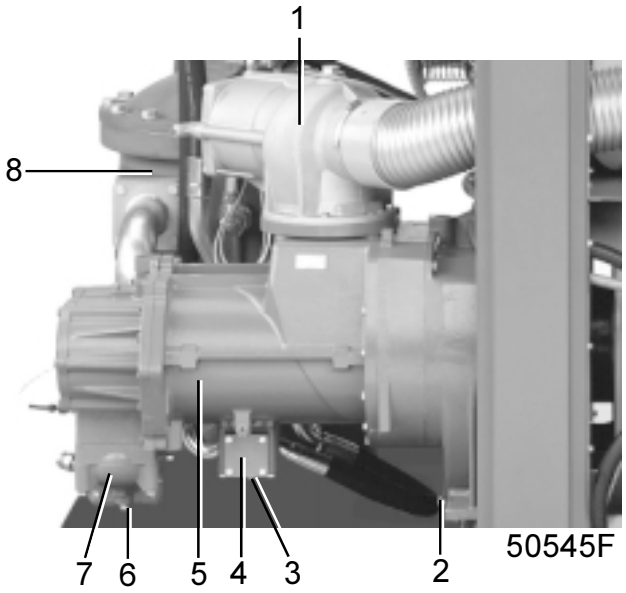
Contact your Customer Centre for the recommended grease type, the greasing quantity and interval for the motor bearings.

Important
Never mix greases of different brands or types.

4.3 Oil specifications

It is strongly recommended to use following oils:
Roto-Inject Fluid is a high-quality lubricant ensuring optimum lubrication for a service life of up to 4000 running hours.
HD Roto-FluidPlus is a very cost-effective oil ensuring optimum lubrication for a service life of up to 8000 running hours.

Important
Never mix oils of different brands or types.



1 Unloader
2 Oil drain plug
3 Oil drain plug
4 Oil stop valve
5 Compressor element
6 Oil drain plug
7 Check valve
8 Air receiver

Fig. 4.1 Compressor element

4.4 Oil change

1. Run the compressor until warm. Stop the compressor and switch off the voltage. Wait a few minutes and depressurize by unscrewing plug (5-Fig. 3.11) only one turn to permit any pressure in the system to escape.
2. **On GA**, loosen vent plugs (5-Fig. 1.3/2-Fig. 1.4) on top of the coolers.
3. Drain the oil by removing the drain plugs. Plugs are provided on the air receiver (6-Fig. 3.11), oil stop valves (3-Fig. 4.1), check valves (6-Fig. 4.1), oil coolers (on GA only) (14 and 15-Fig. 1.3) and gearbox (2-Fig. 4.1). **GA W** are additionally provided with a plug in the oil flexible between the oil filter housing and the oil coolers. Tighten the plugs after draining.
4. Remove filler plug (5-Fig. 3.11). Fill the air receiver with oil until the level reaches the filler opening. Reinstall and tighten plug (5-Fig. 3.11). Tighten the vent plugs (5-Fig. 1.3/2-Fig. 1.4).
5. Run the compressor loaded for a few minutes to allow the oil cooler by-pass valve to open. Stop the compressor and wait a few minutes.
6. Depressurize the system by unscrewing plug (5-Fig. 3.11) only one turn to permit any pressure in the system to escape. Remove the plug. Fill the air receiver with oil until the level reaches the filler opening. Tighten plug (5-Fig. 3.11).
7. After carrying out the service actions of the related service plan, the service warning must be reset. See also section 4.1.

4.5 Oil filter change

1. Stop the compressor, switch off the voltage and depressurize by unscrewing plug (5-Fig. 3.11) only one turn to permit any pressure in the system to escape.
2. Provide an oil pan to avoid possible oil spilling. Remove oil filters (1-Fig. 3.11).
3. Clean the filter seats on the manifold. Oil the gaskets of the new filters and screw them into place until the gaskets contact their seats, then tighten by hand.
4. Tighten filler plug (5-Fig. 3.11).
5. After carrying out the maintenance operations of the related service plan, the service warning must be reset. See also section 4.1.

4.6 Storage after installation

Run the compressor, e.g. twice a week, until warm. Load and unload the compressor a few times to operate the components of the unloading/loading system.

If the compressor is going to be stored without running from time to time, protective measures must be taken. Consult Atlas Copco.

4.7 Service kits

Service kits
Service kits comprise all parts needed for servicing components and offer the benefits of genuine Atlas Copco parts while keeping the maintenance budget low. All service kits are mentioned in the relevant Parts Lists.

Atlas Copco Roto-injectfluid
Atlas Copco Roto-injectfluid (see section 4.3) can be ordered in following quantities:

Quantity	Ordering number
20-litre can	2901 0522 00
209-litre drum	2901 0045 01

Footnotes chapter 4

1) On compressors with optional OSD separator, a valve is fitted underneath the condensate trap. Close the valve after repairing.
2) Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

5 ADJUSTMENTS AND SERVICING PROCEDURES

5.1 Air filters (17-Fig. 1.2/20-Fig. 1.3)

1. Stop the compressor and switch off the voltage. Remove the filters.
2. Fit the new filters.
3. After carrying out the service actions of the related service plan, the service warning must be reset. See also section 4.1.

5.2 Coolers

Keep the coolers clean to maintain the cooling efficiency.

Stop the compressor and switch off the voltage. **On GA**, unscrew bolts (5-Fig. 1.5/20-Fig. 1.6) and rotate the fans away from the cooler block. Blow air from the compressor elements compartment through the coolers towards the drive motor compartment. Remove any dirt. Reposition and fix the fans. Make sure that the fans rotate freely.

Note
If it should be necessary to wash the coolers with a cleansing agent, consult Atlas Copco.

On GA W, consult Atlas Copco for cleaning.

5.3 Safety valve (17-Fig. 1.6)

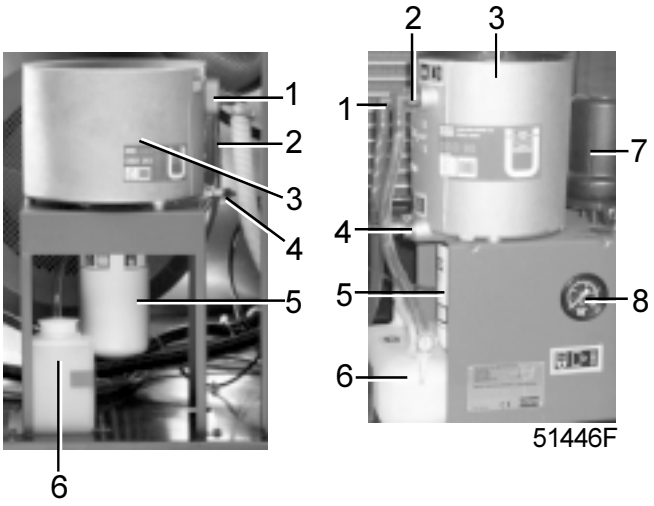
Operating
Operate the safety valve by unscrewing the cap one or two turns and retightening it.

Testing
The valve can be tested on a separate compressed air line. If the valve does not open at the pressure specified in section 7.3, consult Atlas Copco.

Warning *Never run the compressor without safety valves. No adjustments are allowed.*

5.4 Oil/water separators (Fig. 5.1)

As an option, an oil/water separation system can be integrated inside the bodywork to separate the major part of the oil from the condensate. The condensate meets the requirements of the environmental codes.



1	Water outlet	5	Filter
2	Oil outlet	6	Oil collector
3	Water vessel	7	Pre-filter
4	Condensate inlet	8	Pressure gauge

Fig. 5.1 OSD90/315 oil separators (option)

The system includes an OSD315 oil/water separator (shown at the left) connected to the condensate trap downstream of the air cooler. The condensate is led from the condensate trap through inlet (4) and filter (5) towards water vessel (3) where the oil rises due to the difference in specific mass. The water flows through condensate outlet (1) to the outside of the bodywork. The oil flows into collector (6), which must be emptied regularly.

For **Full-feature compressors,** the system also includes an OSD90 (shown at the right) connected to the dryer condensate trap. OSD90 are additionally provided with a pre-filter (7) and a pressure gauge (8).

Servicing procedure

1. Stop the compressor, press emergency stop button (S2-Fig. 3.8) and switch off the voltage.
2. Close the outlet valve and open the valve underneath the air cooler condensate trap.
3. Oil the gaskets of the new filters, fill the filters with water and fit them.
4. On OSD90, unscrew the pre-filter housing, fit a new pre-filter and fit the housing using a new O-ring.
5. Inspect the strainer/restrictors at the inlet of the separator vessels, clean and reinstall them. Close the valve underneath the condensate trap.

6 PROBLEM SOLVING

Warning *Before carrying out any maintenance, repair or adjustment, stop the compressor, press emergency stop button (S2-Fig. 3.8) and switch off the voltage. Close the air outlet valve and open the manual condensate drain valve(s).* ***1)***

Take precautions to avoid an accidental restart. Apply all relevant safety precautions, including those mentioned in this book.

Faults and suggested remedies

1 A shut-down warning message appears on the display
LED (7-Fig. 3.8) will light up indicating that the temperature at the outlet of the compressor elements is too high. See below. The message disappears as soon as the cause of the trouble is remedied

2 Unit is shut down
LED (7-Fig. 3.8) will blink indicating either that the outlet temperature is too high (see below) or that the motor overload relay has tripped. Consult the "User manual for Elektronikon regulator" to remedy the trouble and to reset the message (section "Submenu STATUS DATA")

3 Condensate is not discharged from condensate trap(s) during loading
a Discharge pipe of condensate trap clogged
a Check and correct as necessary
b Float valve of condensate trap(s) malfunctioning
b Remove float valve assembly, clean and check

5 Compressor air delivery or pressure below normal
a Air consumption exceeds air delivery of compressor
a Check equipment connected
b Choked air filters
b Replace filters
c Air leakage
c Check and correct

6 Compressor element outlet temperature or delivery air temperature above normal
a Insufficient cooling air
a Check for cooling air restriction. Improve ventilation of compressor room. Avoid recirculation of cooling air
b **On GA W**, cooling water temperature too high or flow too low
b See section 7.5. Increase water flow and check temperature

Footnote chapter 6

1) On compressors with optional OSD separator, a valve is fitted underneath the condensate trap. Close the valve after repairing.

c Oil level too low
c Check and correct as necessary
d Oil coolers clogged
d Consult Atlas Copco
e Air cooler clogged
e Consult Atlas Copco
f On **GA W**, restriction in cooling water system due to dirt or formation of scale
f Consult Atlas Copco

7 **If an oil/water separator (OSD) is provided: turbulence in separator vessel**
a Air leakage through condensate flexible towards vessel
a Remove float valve assembly, clean and check

7 PRINCIPAL DATA

7.1 Readings on display

Normally the main screen (Fig. 1.12) is shown, indicating the actual air outlet pressure and the actual compressor status. The ↓ key allows the operator to call up other information about the condition of the compressor (see section 3.5).

The readings below are valid when operating at reference conditions (section 7.5.1):

Maximum unloading pressure	See section 7.5
Compressor outlet pressure	Depends on programmed unloading and loading pressures
Pressure drop over air filters	Below 0.050 bar
Pressure difference over oil separator	Below 0.8 bar
Oil injection pressure at the compressor elements	Depends on programmed unloading and loading pressures
Compressor outlet temperature:	
-for GA	Approx. 29°C
-for GA Full-feature	Approx. 26°C
-for GA W	Approx. 25°C
-for GA W Full-feature	Approx. 22°C
Compressor element outlet temperature	Between 55 and 100°C
Cooling air inlet temperature **(on GA)**	Below 40°C **8)**
Cooling water temperature **(on GA W)**	Below 50°C
Pressure dewpoint **(GA Full-feature)**	Approx. 3°C **6)**
Pressure drop over DD filter **(option)**	Below 0.35 bar

7.2 Programmable settings

A number of regulation parameters (e.g. loading and unloading pressures) and protection settings (e.g. shut-down level for the compressor element temperature) are programmable. The "User manual for Elektronikon regulator" deals elaborately with this matter (section "Submenu MODIFY PARAMETERS").

7.3 Settings of safety valve

11 bar(e) for 7.5 bar and 8.5 bar CE version
15 bar(e) for all other versions

Important
Some compressors with a specific approval may have valves with other settings. Always consult the data stamped on the valve or consult Atlas Copco.

7.4 Settings of overload relay, circuit breakers and fuses

7.4.1 Motor overload relay and fuses for 50 Hz compressors

GA / GA W	Motor type, ABB	Supply voltage (V)	Max. setting of overload relay F21 (A)	Max. fuse ratings Class gL/gG Type 2 **2)** (A)	Class gL/gG Type 1 **1)** (A)
90	M2CA 280SMB-4	230	197	2x (3x250)	3x400
90	M2CA 280SMB-4	400	110	3x224	3x400
90	M2CA 280SMB-4	500	87	3x200	3x400
110	M2CA 280MLB-4	230	229	2x (3x300)	3x500
110	M2CA 280MLB-4	400	134	3x250	3x400
110	M2CA 280MLB-4	500	107	3x224	3x400
132	M2CA 315SMA-4	230	270	2x (3x400)	3x500
132	M2CA 315SMA-4	400	161	2x (3x250)	3x400
132	M2CA 315SMA-4	500	128	3x250	3x400
160	M2CA 315MB-4	230	345	2x (3x500)	3x800
160	M2CA 315MB-4	400	191	2x (3x250)	3x400
160	M2CA 315MB-4	500	154	2x (3x200)	3x400
200	M2CA 315LA-4	400	233	2x (3x400)	3x500
200	M2CA 315LA-4	500	186	2x (3x224)	3x355
250	M2CA 315LC-4	400	289	2x (3x315)	2x (3x500)
250	M2CA 315LC-4	500	234	2x (3x400)	3x500

7.4.2 Motor overload relay and fuses for 60 Hz IEC compressors

GA / GA W	Motor type, ABB	Supply voltage (V)	Max. setting of overload relay F21 (A)	Max. fuse ratings Class gL/gG Type 2 **2)** (A)	Class gL/gG Type 1 **1)** (A)
90	M2CA 280MB-4	220-230	208	2x (3x250)	3x400
90	M2CA 280MB-4	380	122	3x224	3x400
90	M2CA 280MB-4	440-460	104	3x200	3x400
110	M2CA 315SMA-4	220-230	257	2x (3x300)	3x500
110	M2CA 315SMA-4	380	149	3x250	3x400
110	M2CA 315SMA-4	440-460	129	3x224	3x400
160	M2CA 315 MB-4	380	195	2x (3x250)	3x400
160	M2CA 315 MB-4	440-460	169	3x250	3x400
200	M2CA 315 LA-4	380	242	2x (3x400)	3x500
200	M2CA 315 LA-4	440-460	204	2x (3x400)	3x500
250	M2CA 315 LB-4	380	284	2x (3x400)	2x (3x500)
250	M2CA 315 LB-4	440-460	246	2x (3x400)	3x500
315	M2CA 315 LC-4	380	319	2x (3x500)	3x800
315	M2CA 315 LC-4	440-460	278	2x (3x400)	2x (3x500)

7.4.3 Motor overload relay and fuses for 60 Hz CSA/UL compressors

With Siemens motor

GA / GA W	Motor type, Siemens	Supply voltage (V)	Max. setting of overload relay F21 (A)	Max. fuse ratings CSA HRC (A)	UL Class K5 (A)
90	1LA6 283-4	440-460	105	3x200	3x175
90	1LA6 283-4	575	80	3x200	3x175
110	1LA6 288-4	440-460	130	2x (3x175)	2x (3x175)
110	1LA6 288-4	575	100	3x200	3x175
160	1LA6 316-4	440-460	166	2x (3x200)	2x (3x200)
160	1LA6 316-4	575	128	2x (3x175)	2x (3x175)
200	1LA6 317-4	440-460	208	2x (3x300)	2x (3x300)
200	1LA6 317-4	575	159	2x (3x200)	2x (3x250)
250	1LA8 315-4	440-460	242	2x (3x300)	2x (3x300)
250	1LA8 315-4	575	184	2x (3x300)	2x (3x300)
315	1LA8 317-4	440-460	269	2x (3x300)	2x (3x300)
315	1LA8 317-4	575	206	2x (3x300)	2x (3x300)

With WEG motor

GA / GA W	Motor type, Siemens	Supply voltage (V)	Max. setting of overload relay F21 (A)	Max. fuse ratings CSA HRC (A)	UL Class K5 (A)
90	W21 125/4 444/5TSD	440-460	100	3x200	3x175
90	W21 125/4 444/5TSD	575	76	3x200	3x175
110	W21 150/4 444/5TSD	440-460	121	2x (3x175)	2x (3x175)
110	W21 150/4 444/5TSD	575	93	3x200	3x175
160	W21 200/4 504/5TSD	440-460	167	2x (3x200)	2x (3x200)
160	W21 200/4 504/5TSD	575	128	2x (3x175)	2x (3x175)
200	W21 250/4 449TCHZ	440-460	215	2x (3x300)	2x (3x300)
200	W21 250/4 449TCHZ	575	165	2x (3x200)	2x (3x250)
250	W21 300/4 5008TD	440-460	245	2x (3x300)	2x (3x300)
250	W21 300/4 5008TD	575	187	2x (3x300)	2x (3x300)
315	W21 350/4 5008TD	440-460	274	2x (3x300)	2x (3x300)
315	W21 350/4 5008TD	575	209	2x (3x300)	2x (3x300)

7.4.4 Fan motor circuit breakers

Fan type	Frequency (Hz)	Supply voltage (V)	Circuit breaker	Max. setting of circuit breaker (A)
Cooling fan for air and oil coolers (GA90/160)	50	230	Q25/26	12.4
Cooling fan for air and oil coolers (GA90/160)	50	400	Q25/26	7.2
Cooling fan for air and oil coolers (GA90/160)	50	500	Q25/26	5.7
Cooling fan for air and oil coolers (GA200/250)	50	230	Q25/26	17.1
Cooling fan for air and oil coolers (GA200/250)	50	400	Q25/26	9.9
Cooling fan for air and oil coolers (GA200/250)	50	500	Q25/26	7.7
Cooling fan for air and oil coolers (GA90/160)	60	220-230	Q25/26	14.3
Cooling fan for air and oil coolers (GA90/160)	60	380	Q25/26	8.6
Cooling fan for air and oil coolers (GA90/160)	60	440-460	Q25/26	7.2
Cooling fan for air and oil coolers (GA90/160)	60	575	Q25/26	5.7
Cooling fan for air and oil coolers (GA200/315)	60	220-230	Q25/26	20.2
Cooling fan for air and oil coolers (GA200/315)	60	380	Q25/26	11.7
Cooling fan for air and oil coolers (GA200/315)	60	440-460	Q25/26	9.9
Cooling fan for air and oil coolers (GA200/315)	60	575	Q25/26	7.7
Bodywork ventilation fan (GA90/250 W)	50	230	Q25	2.5
Bodywork ventilation fan (GA90/250 W)	50	400	Q25	1.4
Bodywork ventilation fan (GA90/250 W)	50	500	Q25	1.1
Bodywork ventilation fan (GA90/315 W)	60	220-230	Q25	2.1
Bodywork ventilation fan (GA90/315 W)	60	380	Q25	1.4
Bodywork ventilation fan (GA90/315 W)	60	440-460	Q25	1.1
Bodywork ventilation fan (GA90/315 W)	60	575	Q25	1.1

7.4.5 Circuit breakers for dryer motor (GA Full-feature)

Type	Frequency (Hz)	Supply voltage (V)	Max. setting of circuit breaker Q40 (A)
GA90/110 dryer motor	50	230	19
GA90/110 dryer motor	50	400	11
GA90/110 dryer motor	50	500	9
GA132/160 dryer motor	50	230	28
GA132/160 dryer motor	50	400	16
GA132/160 dryer motor	50	500	13
GA200/250 dryer motor	50	400	27
GA200/250 dryer motor	50	500	22
GA90/110 dryer motor	60	220-230	25
GA90/110 dryer motor	60	380	15
GA90/110 dryer motor	60	440-460	13
GA90/110 dryer motor	60	575	10
GA160 dryer motor	60	380	22
GA160 dryer motor	60	440-460	19
GA160 dryer motor	60	575	15
GA200/315 dryer motor	60	380	38
GA200/315 dryer motor	60	440-460	33
GA200/315 dryer motor	60	575	25

7.4.6 Circuit breakers for dryer cooling fan motor (GA Full-feature)

Type	Frequency (Hz)	Supply voltage (V)	Max. setting of circuit breaker Q41 (A)
GA90/160 dryer cooling fan motor	50	230	2.5
GA90/160 dryer cooling fan motor	50	400	1.4
GA90/160 dryer cooling fan motor	50	500	1.1
GA200/250 dryer cooling fan motor	50	400	6.2
GA200/250 dryer cooling fan motor	50	500	5.1
GA90/160 dryer cooling fan motor	60	220-230	3.6
GA90/160 dryer cooling fan motor	60	380	2.2
GA90/160 dryer cooling fan motor	60	440-460	1.9
GA90/160 dryer cooling fan motor	60	575	1.4
GA200/315 dryer cooling fan motor	60	380	8.8
GA200/315 dryer cooling fan motor	60	440-460	7.7
GA200/315 dryer cooling fan motor	60	575	5.9

7.4.7 Circuit breaker for control circuit (Q1)

Type	Frequency (Hz)	Supply voltage (V)	Transformer T1 250 VA (A)	Transformer T1 400 VA (A)	Transformer T1 630 VA (A)	Transformer T1 800 VA (A)
GA90/160	50	230	1.5	2.4	3.6	4.5
GA90/160	50	400	0.9	1.4	2.2	2.8
GA90/160	50	500	0.7	1.1	1.8	2.2
GA200/250	50	400	0.9	1.4	2.2	2.8
GA200/250	50	500	0.7	1.1	1.8	2.2
GA90/160	60	220-230	1.6	2.4	3.7	4.7
GA90/160	60	380	0.9	1.4	2.2	2.8
GA90/160	60	440-460	0.8	1.2	1.9	2.4
GA90/160	60	575	0.6	0.92	1.4	1.8
GA200/315	60	380	0.9	1.4	2.2	2.8
GA200/315	60	440-460	0.8	1.2	1.9	2.4
GA200/315	60	575	0.6	0.92	1.4	1.8

7.5 Compressor specifications

7.5.1 Reference conditions

Absolute inlet pressure	bar(a)	1
Relative air humidity	%	0
Air inlet temperature	°C	20
Nominal effective working pressure	bar(e)	See sections below
Cooling water inlet temperature	°C	20

7.5.2 Limitations

Maximum air inlet temperature	°C	40 **8)**
Minimum air inlet temperature	°C	0
Maximum effective working pressure	bar(e)	See sections below
Maximum cooling water inlet temperature	°C	40
Maximum cooling water outlet temperature (open systems)	°C	50
Maximum cooling water outlet temperature (recirculating systems)	°C	60
Maximum cooling water inlet pressure	bar(e)	10

7.5.3 Specific data of 7.5 bar - 50 Hz compressors 3)

Compressor type		90	110	132	160	200	250
Maximum working pressure	bar(e)	7.5	7.5	7.5	7.5	7.5	7.5
Maximum working pressure, Full-feature	bar(e)	7.25	7.25	7.25	7.25	7.25	7.25
Maximum working pressure, Full-feature with DD filter	bar(e)	6.9	6.9	6.9	6.9	6.9	6.9
Nominal working pressure	bar(e)	7	7	7	7	7	7
Nominal working pressure, Full-feature with DD filter	bar(e)	6.9	6.9	6.9	6.9	6.9	6.9
Motor shaft speed	r/min	1490	1490	1490	1490	1490	1490
Power input, GA **7)**	kW	103	124	147	178	224	272
Power input, GA Full-feature **7)**	kW	110	131	156	188	241	289
Power input, GA W **7)**	kW	100	121	142	173	216	264
Power input, GA W Full-feature **7)**	kW	106	127	150	182	232	280
Oil capacity, GA	l	69	75	93	100	130	130
Oil capacity, GA W	l	63	63	85	85	113	113
Sound pressure level, GA **4)**	dB(A)	72	72	74	74	75	75
Sound pressure level, GA W **4)**	dB(A)	71	71	71	71	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.0	3.6	4.2	5.6
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	0.9	1.1	1.3	1.6

7.5.4 Specific data of 8.5 bar - 50 Hz compressors 3)

Compressor type		90	110	132	160	200	250
Maximum working pressure	bar(e)	8.5	8.5	8.5	8.5	8.5	8.5
Maximum working pressure, Full-feature	bar(e)	8.25	8.25	8.25	8.25	8.25	8.25
Maximum working pressure, Full-feature with DD filter	bar(e)	7.9	7.9	7.9	7.9	7.9	7.9
Nominal working pressure	bar(e)	8	8	8	8	8	8
Nominal working pressure, Full-feature with DD filter	bar(e)	7.9	7.9	7.9	7.9	7.9	7.9
Motor shaft speed	r/min	1490	1490	1490	1490	1490	1490
Power input, GA **7)**	kW	103	124	149	179	223	277
Power input, GA Full-feature **7)**	kW	110	131	158	189	239	294
Power input, GA W **7)**	kW	100	121	144	174	207	262
Power input, GA W Full-feature **7)**	kW	106	127	152	183	222	277
Oil capacity, GA	l	69	75	93	100	130	130
Oil capacity, GA W	l	63	63	85	85	113	113
Sound pressure level, GA **4)**	dB(A)	72	72	74	74	75	75
Sound pressure level, GA W **4)**	dB(A)	71	71	71	71	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.0	3.6	4.2	5.6
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	0.9	1.1	1.3	1.6

7.5.5 Specific data of 10 bar - 50 Hz compressors 3)

Compressor type		90	110	132	160	200	250
Maximum working pressure	bar(e)	10	10	10	10	10	10
Maximum working pressure, Full-feature	bar(e)	9.75	9.75	9.75	9.75	9.75	9.75
Maximum working pressure, Full-feature with DD filter	bar(e)	9.4	9.4	9.4	9.4	9.4	9.4
Nominal working pressure	bar(e)	9.5	9.5	9.5	9.5	9.5	9.5
Nominal working pressure, Full-feature with DD filter	bar(e)	9.4	9.4	9.4	9.4	9.4	9.4
Motor shaft speed	r/min	1490	1490	1490	1490	1490	1490
Power input, GA **7)**	kW	102	124	146	178	224	273
Power input, GA Full-feature **7)**	kW	108	131	155	187	240	290
Power input, GA W **7)**	kW	99	121	141	173	216	265
Power input, GA W Full-feature **7)**	kW	104	127	149	181	231	281
Oil capacity, GA	l	69	75	93	100	130	130
Oil capacity, GA W	l	63	63	85	85	113	113
Sound pressure level, GA **4)**	dB(A)	72	72	74	74	75	75
Sound pressure level, GA W **4)**	dB(A)	71	71	71	71	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.0	3.6	4.2	5.6
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	0.9	1.1	1.3	1.6

7.5.6 Specific data of 13 bar - 50 Hz compressors 3)

Compressor type		90	110	132	160	200	250
Maximum working pressure	bar(e)	13	13	13	13	13	13
Maximum working pressure, Full-feature	bar(e)	12.75	12.75	12.75	12.75	12.75	12.75
Maximum working pressure, Full-feature with DD filter	bar(e)	12.4	12.4	12.4	12.4	12.4	12.4
Nominal working pressure	bar(e)	12.5	12.5	12.5	12.5	12.5	12.5
Nominal working pressure, Full-feature with DD filter	bar(e)	12.4	12.4	12.4	12.4	12.4	12.4
Motor shaft speed	r/min	1490	1490	1490	1490	1490	1490
Power input, GA **7)**	kW	104	124	149	182	241	289
Power input, GA Full-feature **7)**	kW	110	130	158	191	258	306
Power input, GA W **7)**	kW	101	121	144	177	233	281
Power input, GA W Full-feature **7)**	kW	106	126	152	185	250	298
Oil capacity, GA	l	69	75	93	100	130	130
Oil capacity, GA W	l	63	63	85	85	113	113
Sound pressure level, GA **4)**	dB(A)	72	72	74	74	75	75
Sound pressure level, GA W **4)**	dB(A)	71	71	71	71	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.0	3.6	4.2	5.6
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	0.9	1.1	1.3	1.6

7.5.7 Specific data of 100 psi - 60 Hz compressors 3)

Compressor type		90	110	160	200	250	315
Maximum working pressure	bar(e)	7.4	7.4	7.4	7.4	7.4	7.4
Maximum working pressure, Full-feature	bar(e)	7.15	7.15	7.15	7.15	7.15	7.15
Maximum working pressure, Full-feature with DD filter	bar(e)	6.8	6.8	6.8	6.8	6.8	6.8
Nominal working pressure	bar(e)	6.9	6.9	6.9	6.9	6.9	6.9
Nominal working pressure, Full-feature with DD filter	bar(e)	6.8	6.8	6.8	6.8	6.8	6.8
Motor shaft speed	r/min	1790	1790	1790	1790	1790	1790
Power input, GA **7)**	kW	109	133	178	217	254	291
Power input, GA Full-feature **7)**	kW	116	140	188	234	271	309
Power input, GA W **7)**	kW	105	128	171	208	245	282
Power input, GA Full-feature W **7)**	kW	112	134	181	225	262	300
Oil capacity, GA	l	69	75	100	130	130	130
Oil capacity, GA W	l	63	63	85	113	113	113
Sound pressure level, GA **4)**	dB(A)	76	76	78	76	76	76
Sound pressure level, GA W **4)**	dB(A)	71	71	71	72	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.6	4.2	5.6	6.9
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	1.1	1.3	1.6	1.8

7.5.8 Specific data of 125 psi - 60 Hz compressors 3)

Compressor type		90	110	160	200	250	315
Maximum working pressure	bar(e)	9.1	9.1	9.1	9.1	9.1	9.1
Maximum working pressure, Full-feature	bar(e)	8.85	8.85	8.85	8.85	8.85	8.85
Maximum working pressure, Full-feature with DD filter	bar(e)	8.5	8.5	8.5	8.5	8.5	8.5
Nominal working pressure	bar(e)	8.6	8.6	8.6	8.6	8.6	8.6
Nominal working pressure, Full-feature with DD filter	bar(e)	8.5	8.5	8.5	8.5	8.5	8.5
Motor shaft speed	r/min	1790	1790	1790	1790	1790	1790
Power input, GA **7)**	kW	109	128	175	220	257	294
Power input, GA Full-feature **7)**	kW	116	136	184	236	273	312
Power input, GA W **7)**	kW	105	124	168	211	248	285
Power input, GA Full-feature W **7)**	kW	112	131	176	227	264	303
Oil capacity, GA	l	69	75	100	130	130	130
Oil capacity, GA W	l	63	63	85	113	113	113
Sound pressure level, GA **4)**	dB(A)	76	76	78	76	76	76
Sound pressure level, GA W **4)**	dB(A)	71	71	71	72	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.6	4.2	5.6	6.9
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	1.1	1.3	1.6	1.8

7.5.9 Specific data of 150 psi - 60 Hz compressors 3)

Compressor type		90	110	160	200	250	315
Maximum working pressure	bar(e)	10.8	10.8	10.8	10.8	10.8	10.8
Maximum working pressure, Full-feature	bar(e)	10.55	10.55	10.55	10.55	10.55	10.55
Maximum working pressure, Full-feature with DD filter	bar(e)	10.2	10.2	10.2	10.2	10.2	10.2
Nominal working pressure	bar(e)	10.3	10.3	10.3	10.3	10.3	10.3
Nominal working pressure, Full-feature with DD filter	bar(e)	10.2	10.2	10.2	10.2	10.2	10.2
Motor shaft speed	r/min	1790	1790	1790	1790	1790	1790
Power input, GA **7)**	kW	110	132	178	222	260	303
Power input, GA Full-feature **7)**	kW	117	139	187	238	277	320
Power input, GA W **7)**	kW	106	127	171	211	248	285
Power input, GA Full-feature W **7)**	kW	113	133	179	227	264	303
Oil capacity, GA	l	69	75	100	130	130	130
Oil capacity, GA W	l	63	63	85	113	113	113
Sound pressure level, GA **4)**	dB(A)	76	76	78	76	76	76
Sound pressure level, GA W **4)**	dB(A)	71	71	71	72	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.6	4.2	5.6	6.9
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	1.1	1.3	1.6	1.8

7.5.10 Specific data of 200 psi - 60 Hz compressors 3)

Compressor type		90	110	160	250	315
Maximum working pressure	bar(e)	13.8	13.8	13.8	13.8	13.8
Maximum working pressure, Full-feature	bar(e)	13.55	13.55	13.55	13.55	13.55
Maximum working pressure, Full-feature with DD filter	bar(e)	13.2	13.2	13.2	13.2	13.2
Nominal working pressure	bar(e)	13.3	13.3	13.3	13.3	13.3
Nominal working pressure, Full-feature with DD filter	bar(e)	13.2	13.2	13.2	13.2	13.2
Motor shaft speed	r/min	1790	1790	1790	1790	1790
Power input, GA **7)**	kW	111	134	178	269	307
Power input, GA Full-feature **7)**	kW	118	141	187	285	323
Power input, GA W **7)**	kW	107	129	171	260	298
Power input, GA Full-feature W **7)**	kW	113	136	179	276	314
Oil capacity, GA	l	69	75	100	130	130
Oil capacity, GA W	l	63	63	85	113	113
Sound pressure level, GA **4)**	dB(A)	76	76	78	76	76
Sound pressure level, GA W **4)**	dB(A)	71	71	71	72	72
Maximum cooling water flow, GA W **9)**	l/s	2.0	2.5	3.6	5.6	6.9
Minimum cooling water flow, GA W **10)**	l/s	0.7	0.8	1.1	1.6	1.8

7.6 Conversion list of SI units into British/American units

1 bar = 14.504 psi
1 g = 0.035 oz
1 kg = 2.205 lb
1 kW = 1.341 hp (UK and US)
1 l = 0.264 US gal
1 l = 0.220 Imp gal (UK)
1 l = 0.035 cu.ft
1 l/s = 2.117 cfm
1 mm = 0.039 in
1 mbar = 0.401 in water column
1 N = 0.225 lbf
1 Nm = 0.738 lbf.ft
x degrees Celsius = (32 + 1.8 x) degrees Fahrenheit **5)**

Footnotes chapter 7

1) Disturbance or destruction of the contactor and/or overload relay may occur (if damaged, the component must be replaced).
2) No damage will occur at the overload relay.
3) At reference conditions (see section 7.5.1).
4) According to PNEUROP PN8NTC2.2 at 1 m distance under free field conditions with a tolerance of 3 dB.
5) A temperature difference of 1 degree Celsius = a temperature difference of 1.8 degrees Fahrenheit.
6) At ambient of 20 degrees Celsius and 80% relative humidity.
7) At supply voltage of 400 V (50 Hz) or 440 V (60 Hz). Data may slightly differ at other voltages or for units with DD filter.
8) 50 degrees Celsius for HAT (High Ambient Temperature) versions.
9) At a temperature rise of 10 degrees Celsius.
10) At a temperature rise of 35 degrees Celsius.